Morrison

DINOSAURS!

•DISCOVER THE GIANTS OF THE PREHISTORIC WORLD•

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BOTHRIOSPONDYLUS

Bothriospondylus was longer than a lorry and twice the height of a giraffe.

The name of this giant plant-eater means ‘excavated vertebrae’, because the only fossils of *Bothriospondylus* found so far are a few pieces of its backbone.

KEY CLUES

Experts were able to use these bones as vital clues to form a picture of what *Bothriospondylus* looked like. Although it was huge, *Bothriospondylus* was not quite as big as its relative, *Brachiosaurus*.

AFRICAN BONES

Bothriospondylus was found in Madagascar – an island in the Indian Ocean off the coast of East Africa. In the early part of this century, a wealth of discoveries was made in eastern areas of Africa. Between 1909 and 1912 more than 200 tonnes of dinosaur bones were collected from Tanzania alone!

FOREST FOOD

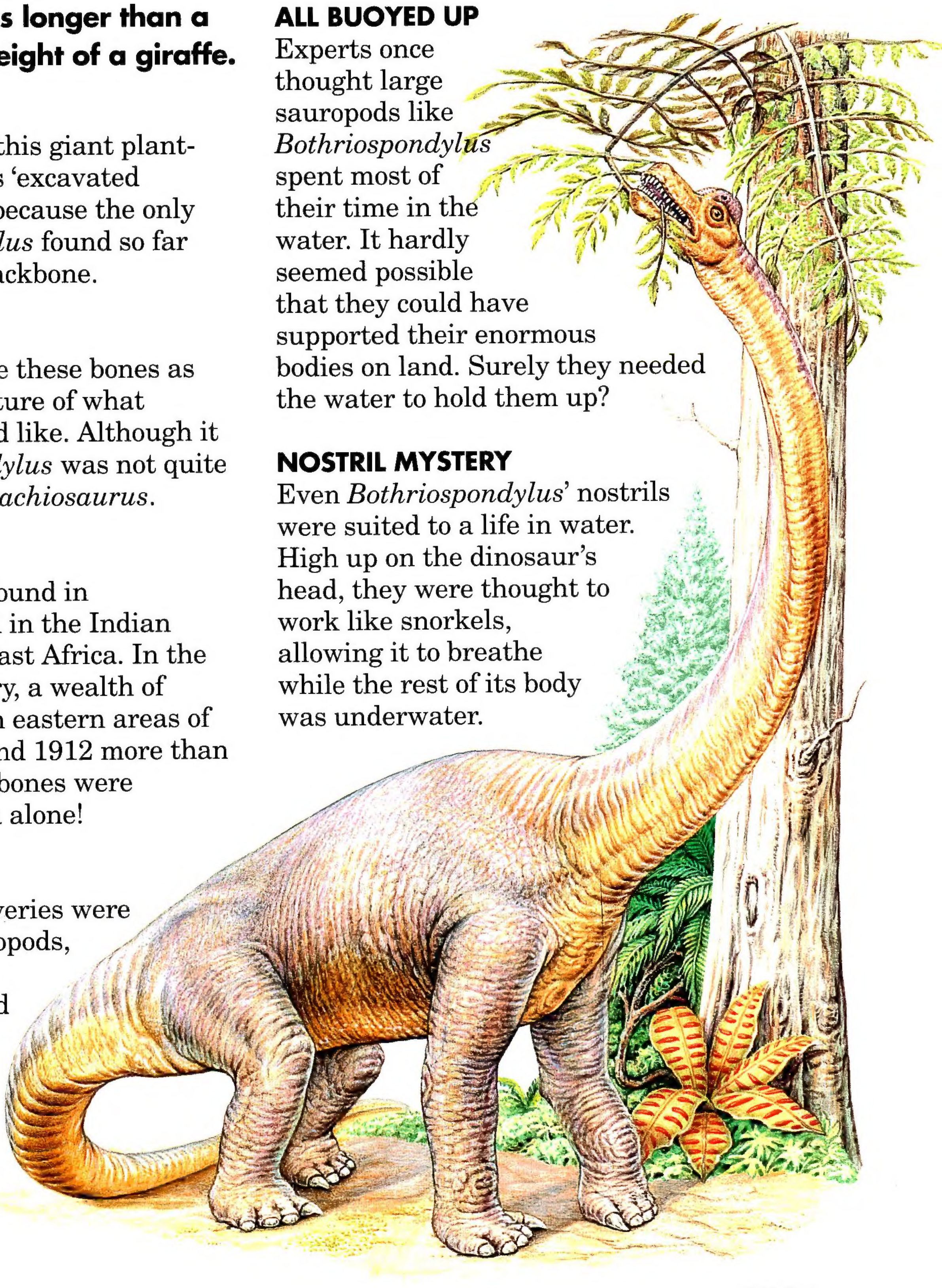
Among the many discoveries were the fossils of huge sauropods, like *Dicraeosaurus* and *Barosaurus,* which lived at about the same time as *Bothriospondylus*. The African forests of the Late Jurassic would have provided enough juicy meals for them all!

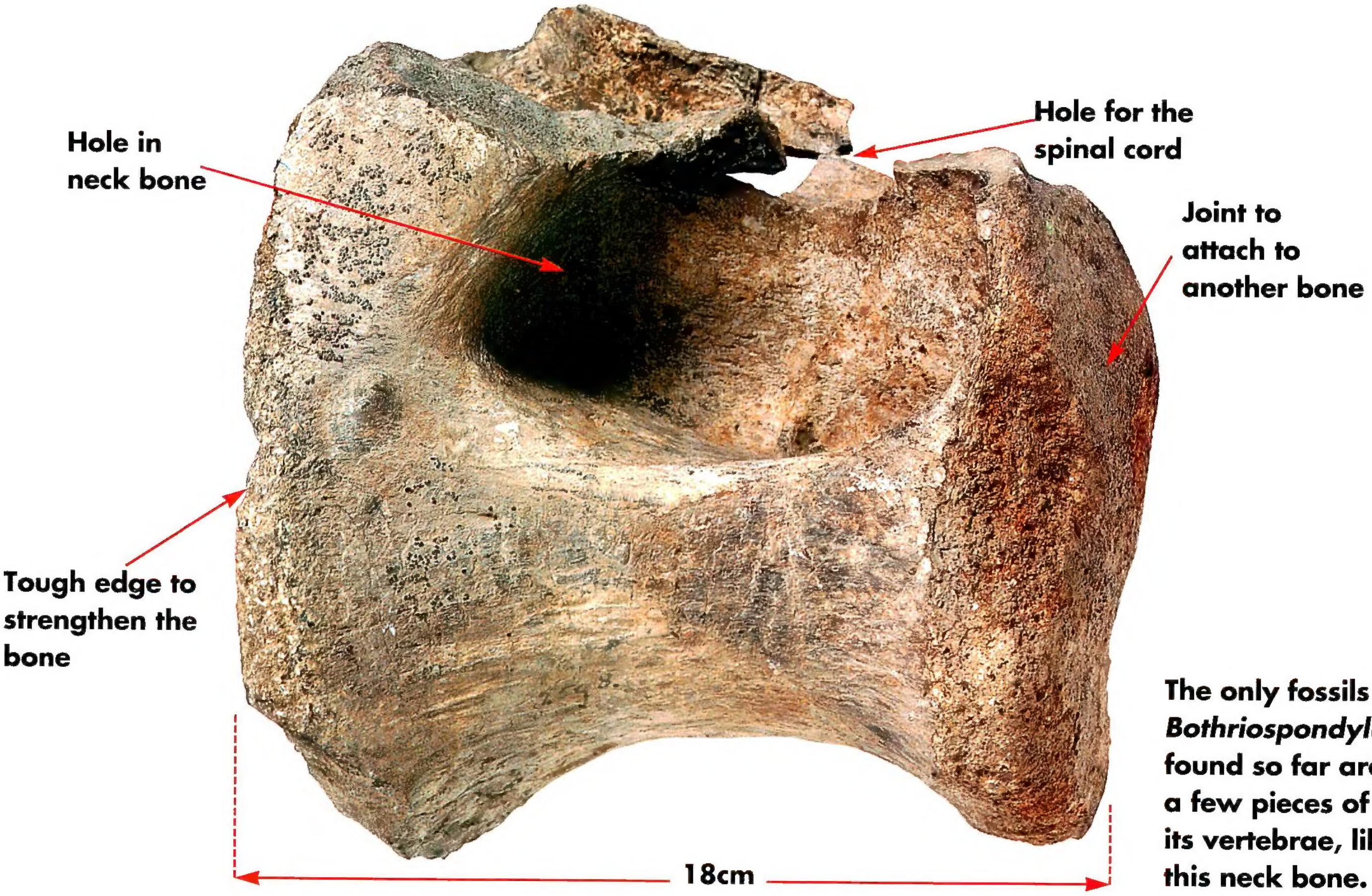
ALL BUOYED UP

Experts once thought large sauropods like *Bothriospondylus* spent most of their time in the water. It hardly seemed possible that they could have supported their enormous bodies on land. Surely they needed the water to hold them up?

NOSTRIL MYSTERY

Even *Bothriospondylus*’ nostrils were suited to a life in water. High up on the dinosaur’s head, they were thought to work like snorkels, allowing it to breathe while the rest of its body was underwater.




Hole in neck bone
Hole for the spinal cord
Joint to attach to another bone
Tough edge to strengthen the bone
18cm

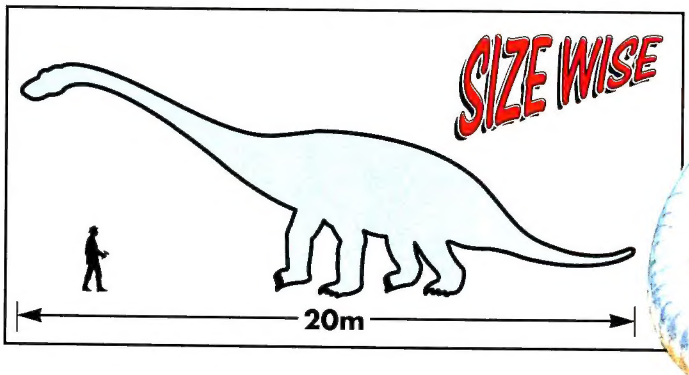
The only fossils of *Bothriospondylus* found so far are a few pieces of its vertebrae, like this neck bone.

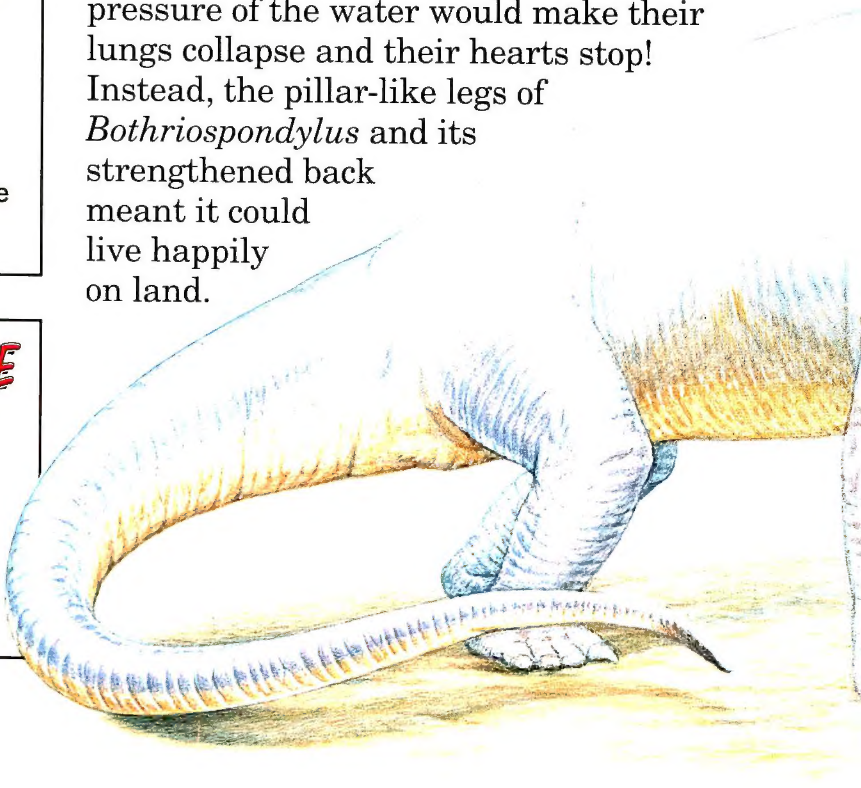
MONSTER FACTS

- **NAME:** *Bothriospondylus* (both-ree-oh-spond-ill-us) means 'excavated vertebrae'
- **GROUP:** dinosaur
- **SIZE:** up to 20m long
- **FOOD:** plants
- **LIVED:** about 140 million years ago in the Late Jurassic in Madagascar, Africa

UNDER PRESSURE

In the past 20 years, experts have realised *Bothriospondylus* did not live in water. If tall dinosaurs were submerged, the pressure of the water would make their lungs collapse and their hearts stop! Instead, the pillar-like legs of *Bothriospondylus* and its strengthened back meant it could live happily on land.





Is it true that the biggest dinosaurs lived in the Jurassic Period ?

Yes! The sauropods were the longest and tallest of all the dinosaurs. Some of the biggest, such as *Seismosaurus*, *Brachiosaurus* and *Diplodocus*, lived in the Late Jurassic, about 145 million years ago. At that time, about half of all the plant-eating dinosaurs in the world were sauropods. Fewer sauropods survived into the Cretaceous Period and none of these reached the great sizes of *Supersaurus* and *Ultrasauros*.

AHEAD – BY A NECK

Bothriospondylus' front limbs were longer than its back limbs and its body sloped downwards from its shoulders, like a giraffe's. It was able to browse at the very tops of trees where other plant-eaters, like *Camptosaurus*, could not reach. Tall tree ferns with long, bare trunks grew in the Jurassic Period and only long-necked dinosaurs like *Bothriospondylus* could have reached the tempting leaves that grew at the top of these trees.

ON THE EDGE

Animals such as hippopotamuses, which spend a lot of time in water, tend to have short legs, broad feet and barrel-shaped bodies. But *Bothriospondylus* had legs rather like those of an elephant. It also had a narrow, deep chest. It probably wandered along the edges of lakes and swamps, steadying itself by gripping the muddy surface with its toe claws. With its long neck, *Bothriospondylus* could reach out into the centre of pools and take a drink without getting its feet wet.

BIG NOSTRILS

Bothriospondylus probably had a keen sense of smell because its broad nostrils were set high up on its tiny head, above the level of its eyes. Some experts have suggested that the nostrils of brachiosaurids had a lining which shed heat to cool the brain. *Bothriospondylus'* brain was very small.

Just like today's giraffe (right), *Bothriospondylus* (below) found drinking from a pool of water a breeze! By stretching its long neck over the water, it saved its feet from getting wet!

HALLUCIGENIA

Mysterious *Hallucigenia* made experts think they were dreaming!

When *Hallucigenia's* fossils were found, experts could hardly believe their eyes. It looked very bizarre and unlike any other known marine animal. It was found among the rich deposits of marine fossils in the Burgess Shale, British Columbia.

TOPSY-TURVY

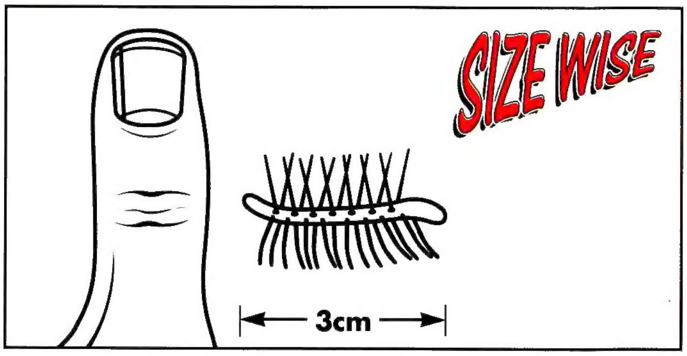
Hallucigenia's tube-shaped body was about half the size of your little finger. At one end it had a rounded head and at the other end there was a tail which curved upwards. At first, experts were puzzled about which way up this strange creature stood as it moved along the sea bed. New evidence shows *Hallucigenia* had pairs of fleshy legs beneath its narrow body.

SPIKY SUPPER

Along its back, *Hallucigenia* had seven pairs of sharp spines sticking upwards. These probably protected it from predators which would not have fancied a spiky meal!

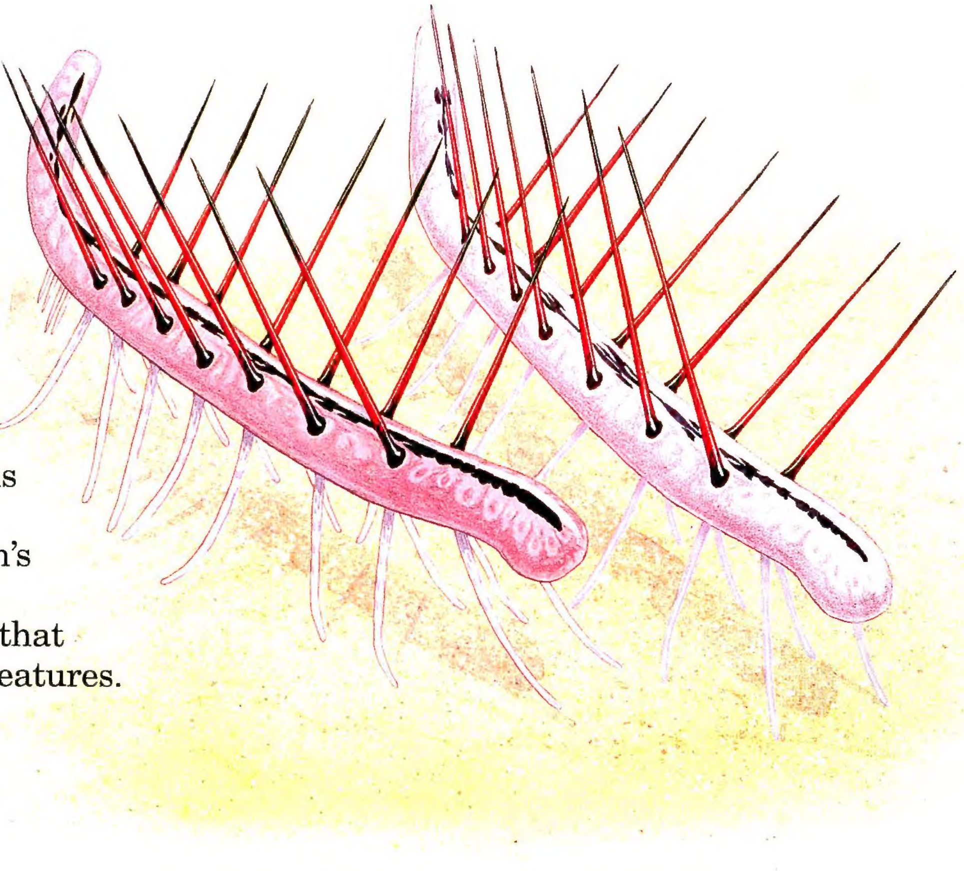
SEA BED SCAVENGER

Fifteen *Hallucigenia* fossils were found around the remains of a large worm. They were obviously feasting on the worm's dead body. This suggests that *Hallucigenia* was a scavenger that survived by eating dead sea creatures.



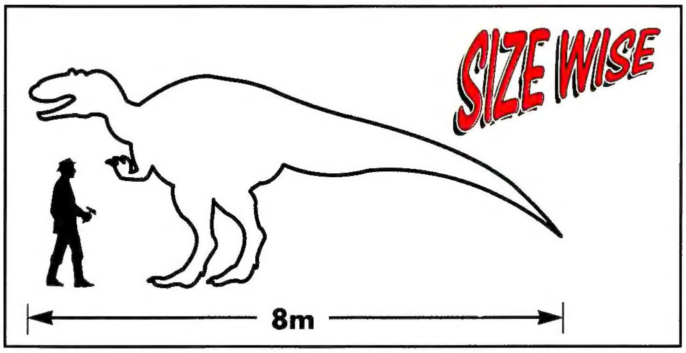
MONSTER FACTS

- **NAME:** *Hallucigenia* (hal-lucy-gane-ee-a) means 'unreal'
- **GROUP:** unknown
- **SIZE:** about 3cm long
- **FOOD:** flesh of small, dead sea creatures
- **LIVED:** about 600 million years ago in the Cambrian seas of south western Canada



SZECHUANOSAURUS

As long as a soccer goal is wide, *Szechuanosaurus* terrorised the gentle plant-eaters of China.



For many years, *Szechuanosaurus* was the only large theropod known to have lived in China. Now it has been joined by *Yangchuanosaurus*, another flesh-eater found in 1978 in Sichuan Province, as well as *Xuanhanosaurus* which was named six years later.

GOOD GRIP

Szechuanosaurus looked rather like a small *Allosaurus*. It had long, powerful hind limbs and short arms. Three, clawed fingers on each hand helped *Szechuanosaurus* to hold its prey firmly as it attacked with its gaping jaws. The claws were useful for tearing the flesh off the bones of dead creatures.

DEADLY TEETH

The only *Szechuanosaurus* fossils ever found were four large teeth. As sharp as steak knives, they were deadly weapons.

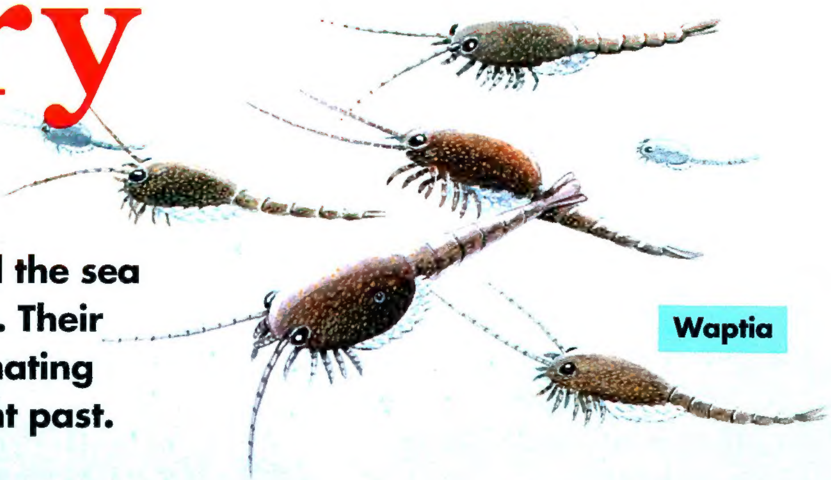
SURPRISE, SURPRISE!

Szechuanosaurus had a large head supported by strong neck muscles. It was not built for speed and probably ambushed its prey.

MONSTER FACTS

- **NAME:** *Szechuanosaurus* (sich-wan-oh-saw-rus) means 'reptile from Sichuan'
- **GROUP:** dinosaur
- **SIZE:** 8m long
- **FOOD:** meat
- **LIVED:** about 145 million years ago in the Late Jurassic Period in Sichuan and Xinjiang Provinces, China

A snapshot from history



Many weird and wonderful animals stalked the sea bed 500 million years ago. Their rare fossils give us a fascinating glimpse of life in the distant past.

One of the jewels in the crown of fossils is the Burgess Shale. This layer of rock, only 2.5m thick, is found in the side of the Rocky Mountains in Yoho National Park, British Columbia, Canada. It was discovered in 1909 by fossil expert Charles Doolittle Walcott.

A MOUNTAIN OF SEA CREATURES

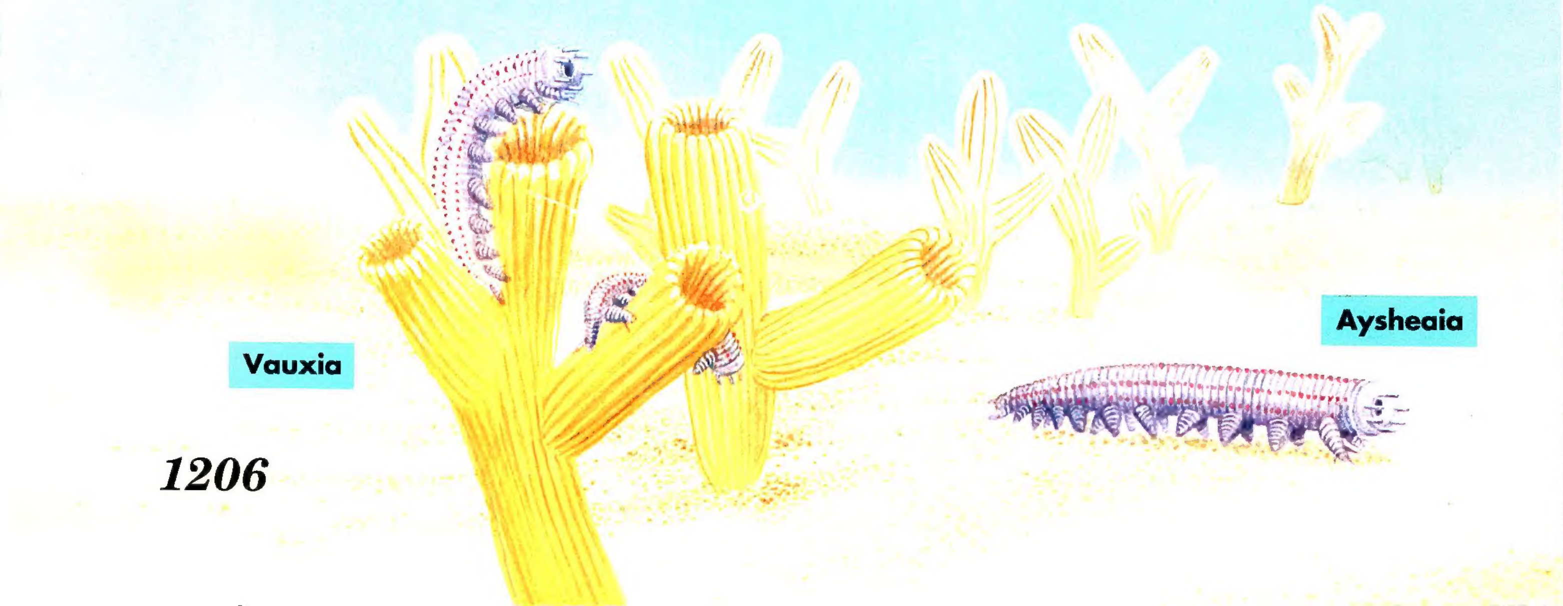
Walcott dug out some of the rock and found an incredible collection of fossils – over 65,000 specimens, from more than 120 different kinds of prehistoric animals. Astonishingly, they are sea creatures. So, what is now a mountain was once at the bottom of the sea!

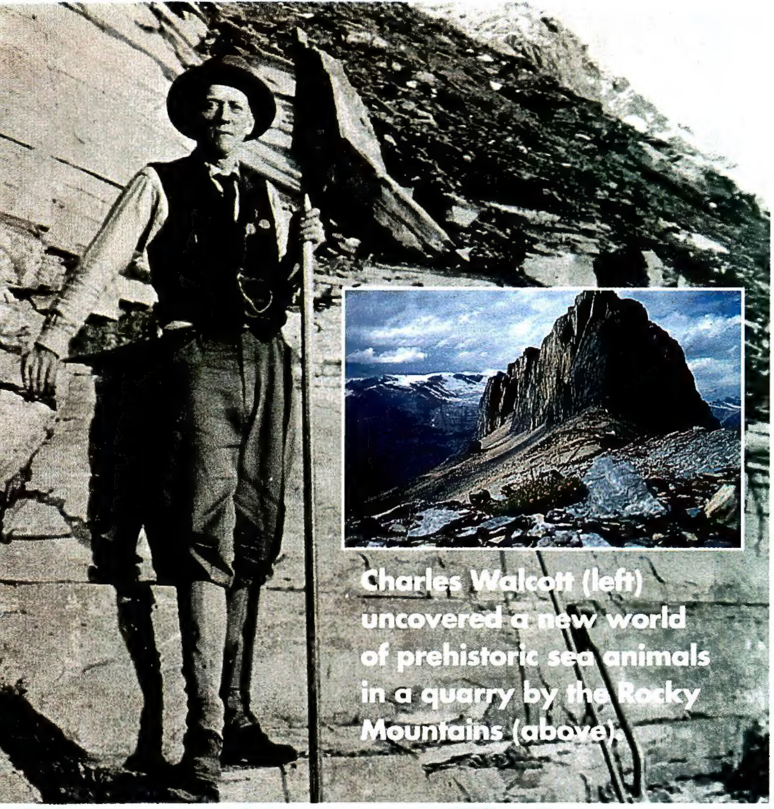
BEFORE DINOSAURS

Even more amazingly, the Burgess fossils are soft-bodied animals, which rarely form fossils. They date back over 500 million years – long before dinosaurs or any other animals lived on land.

THE CALM BEFORE THE STORM

About 520 million years ago, animals were crawling, swimming, grazing and hunting on the bottom of a shallow sea which covered what is now south-west Canada. *Aysheaia*, a velvet worm, wandered over the branches of a large sponge, *Vauxia*. The worm walked on its stubby legs, and may have nibbled at the sponge's spiky flesh.





Charles Walcott (left) uncovered a new world of prehistoric sea animals in a quarry by the Rocky Mountains (above).

A BUSY DAY IN THE SEA

In mid water, a shoal of shrimp-like *Waptia* swam past. They rowed themselves along with their many pairs of legs and gills. Below, on the mud, the trilobite *Naraoia* snuffled along in search of food.

MUD-SLIDE TO DEATH

Gradually, a storm blew up and the waves whipped up the water. Suddenly, the mud shifted and slid down the steep side of the reef, carrying the animals to their deaths in deeper water. They were buried in an instant.

Fossils, like the *Anomalocaris* claw shown here (left), are still being dug from the Burgess Shale today.

What is? SHALE

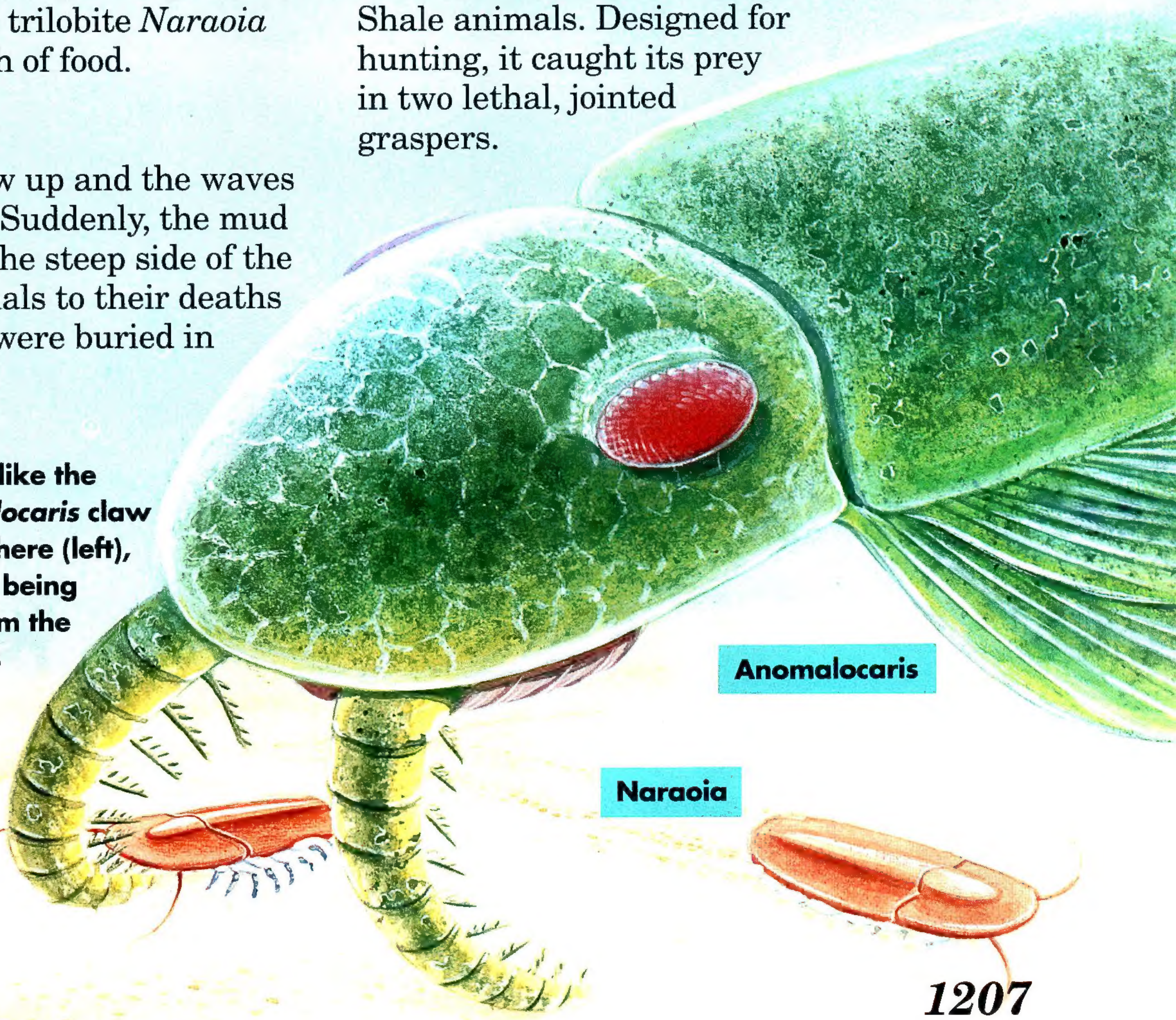
Shale is a type of rock formed from particles of clay and silt that settled in layers, long ago, on the bottom of the sea. Any remains of living things were also turned to rock, as fossils. Like the Burgess Shale, many shales split easily into flat sheets, exposing the fossils inside.

PRESERVED FOREVER

The deep water had little oxygen, so the creatures' bodies did not rot quickly. They were preserved by the mud and became thin black fossils.

MONSTER IN MINIATURE

Anomalocaris was perhaps the very first sea monster. It was only 60cm long, but it was a giant among the other Burgess Shale animals. Designed for hunting, it caught its prey in two lethal, jointed graspers.



Is it true that the Burgess Shale changed scientists' ideas about the 'tree of life'?

Yes. When the Burgess Shale was first studied, many scientists believed the evolutionary 'tree of life' began with simple life-forms that gradually got more complicated and diverse. But later studies showed that many of the shale animals had no living relatives and belonged to very different groups that have since died out.

OLD SOFTIES

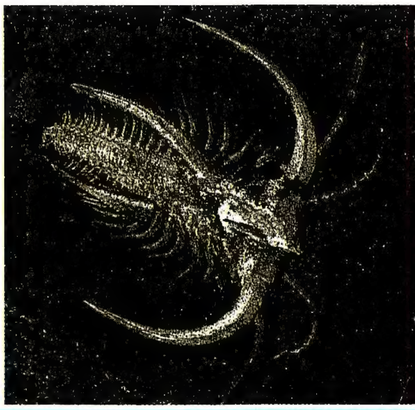
Worms have almost no hard parts in their bodies, and so their fossils are very rare. The Burgess Shale gives us a wonderful snapshot of the history of these fascinating creatures. For example, *Canadia* was a bristle-worm. It could swim or crawl using the bristly, paddle-like flaps along the sides of its body. It also had pincer-like parts on its mouth for catching food.

SWIMMING CUCUMBERS!

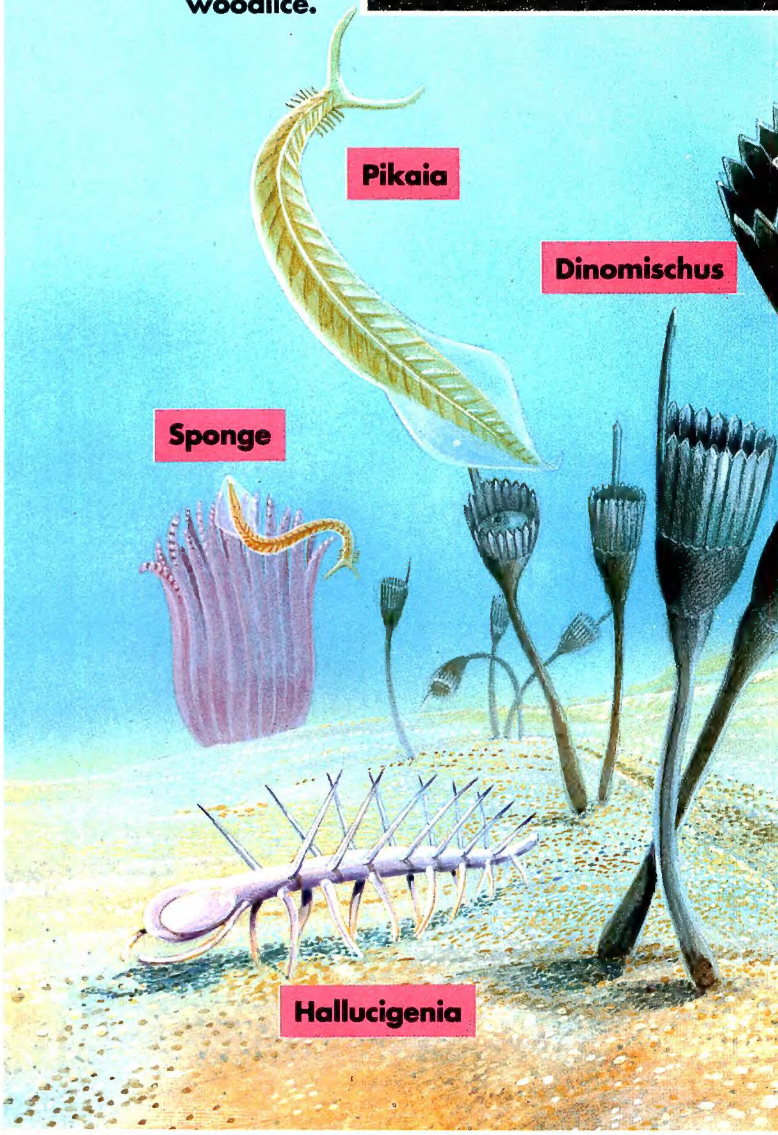
Echinoderms – like starfish and sea urchins – are familiar today. The Burgess version was *Eldonia*, which was possibly a swimming sea cucumber. However, the fossils were not well preserved and may turn out to be part of another animal. One of the most exciting Burgess animals was *Pikaia*. It was a small eel-like creature about 5cm long. Both these animals belong to our own group, the chordates, and show how backbones might have evolved.

SWEET SHELL OF SUCCESS

Many of the Burgess animals were arthropods – animals with shelled bodies and jointed legs. But only a few are familiar to us today. *Marrella* had a very basic arthropod design which is still seen in modern woodlice, crabs and lobsters.

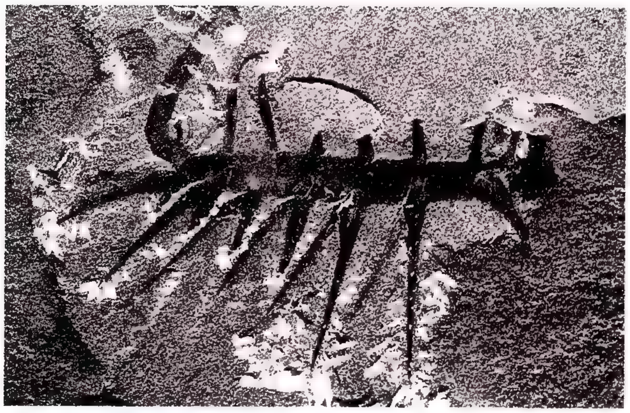


Marrella (right) had the jointed limbs and segmented body of an arthropod – like today's crabs, lobsters and woodlice.

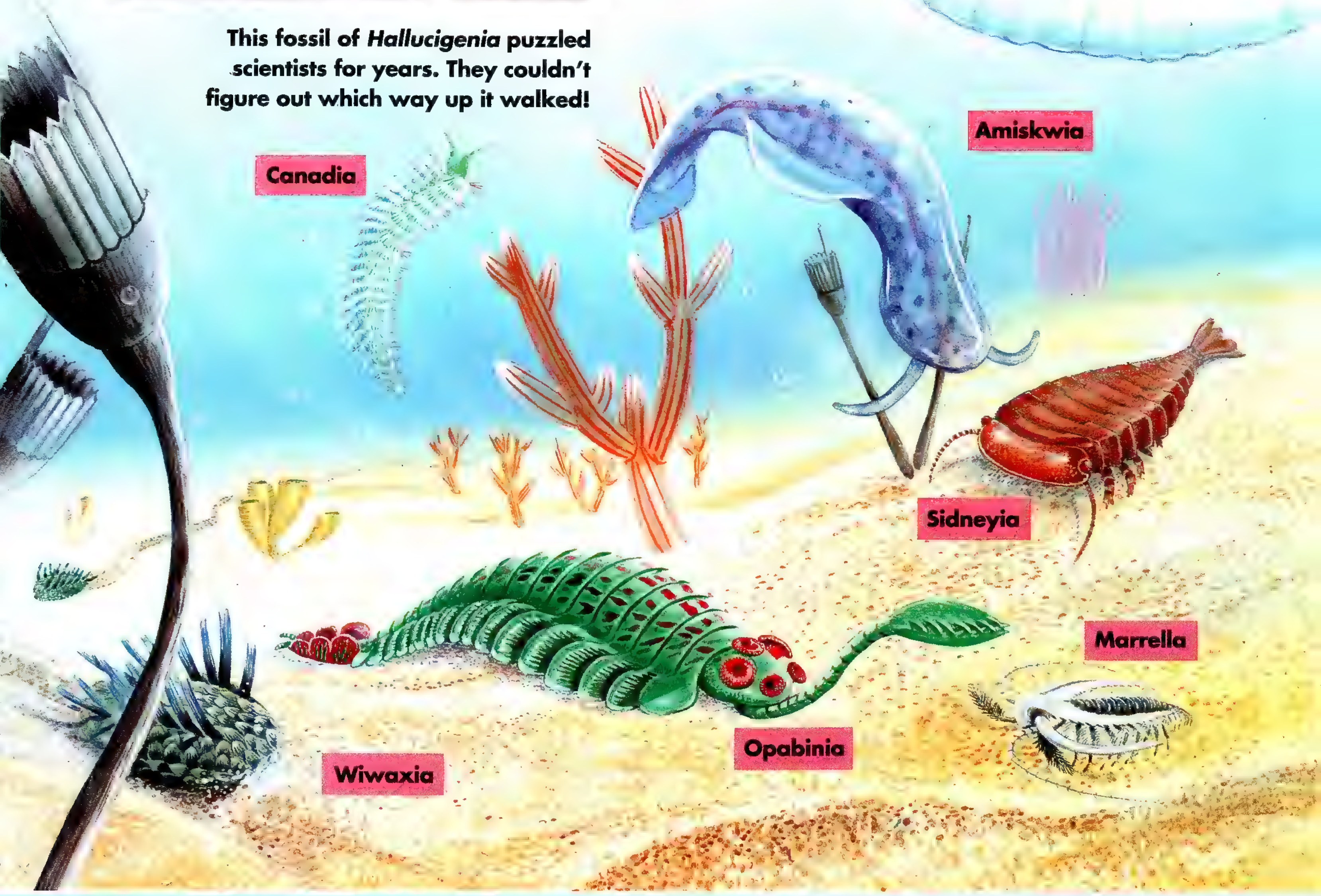


LAST MEAL OF A HUNTER

Scientists once thought that most early animals fed on seaweeds, or hoovered up bits and pieces from the muddy bottom of the seas. But another arthropod, *Sidneyia*, changed these ideas. It was so well preserved that the remains of its last meal can be seen inside its gut. The last thing it had eaten was a trilobite.



This fossil of *Hallucigenia* puzzled scientists for years. They couldn't figure out which way up it walked!



FOSSIL PUZZLES

Wiwaxia was about 3cm long and shaped like half a lemon. It was covered with hard plates and spines. For years, scientists wondered which way up another sea creature, *Hallucigenia,* walked! *Opabinia* had five eyes, and a clawed nozzle like a hoover-tube on its head. *Dinomischus* was like a half-opened daisy on a stalk!

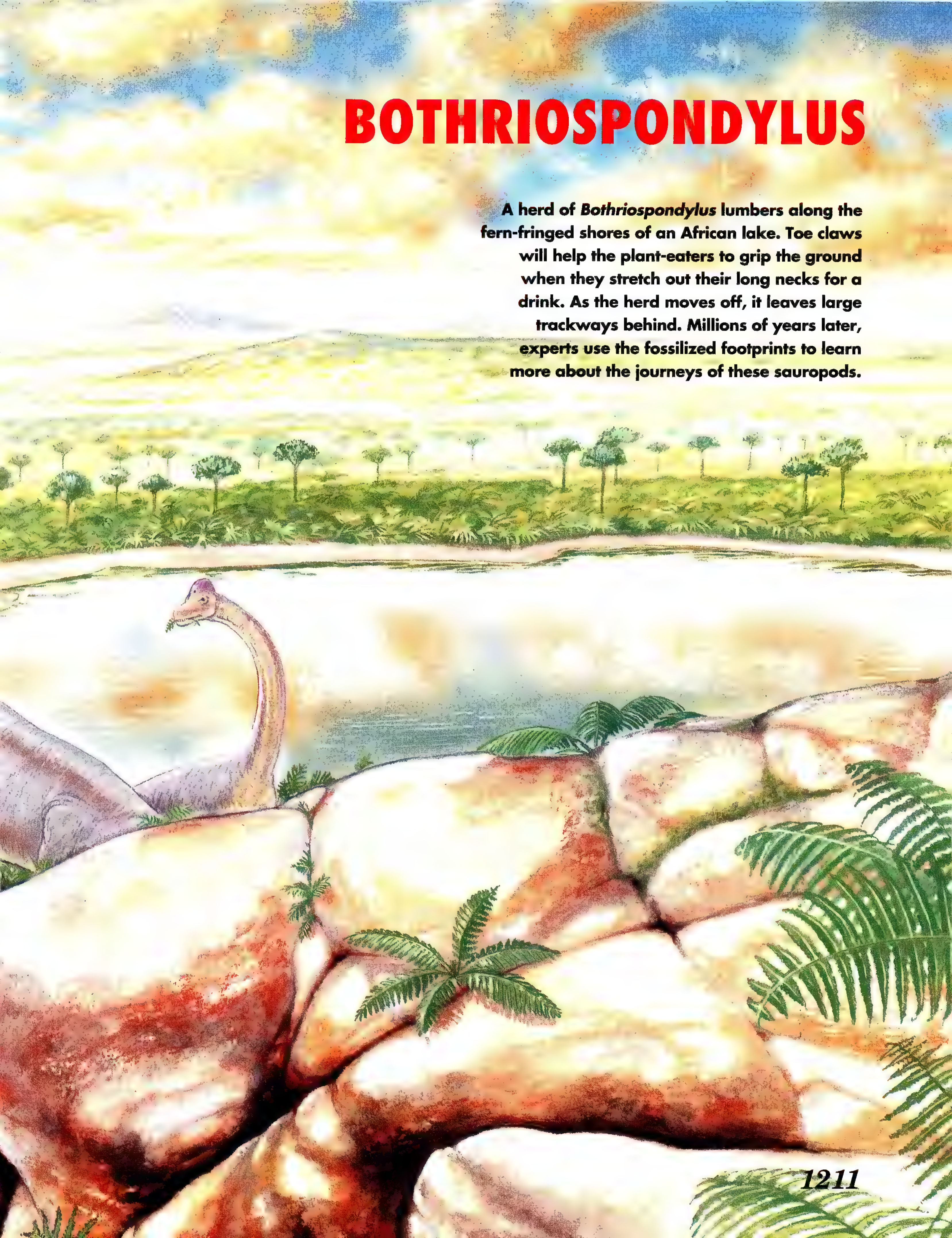
WEIRD AND WONDERFUL

Amiskwia swam using fins and a tail paddle. It had two tentacles at the front end – if it was the front end! The Burgess Shale fossils continue to fascinate and puzzle scientists. They show that, over 500 million years ago, there was a bigger explosion of life more weird and wonderful than the world has ever seen since.

GIANTS OF THE PAST

1210

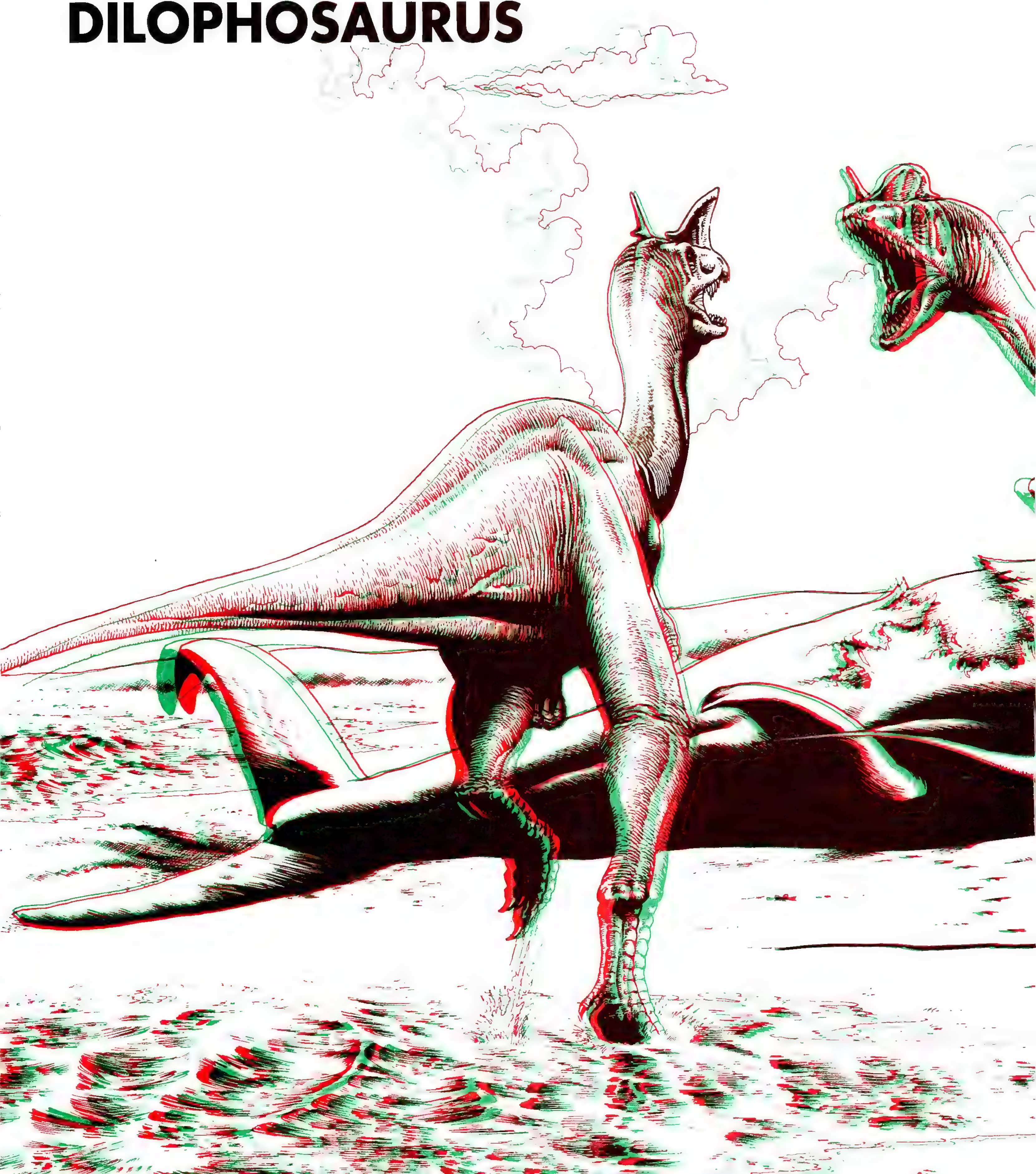
BOTHRIOSPONDYLUS



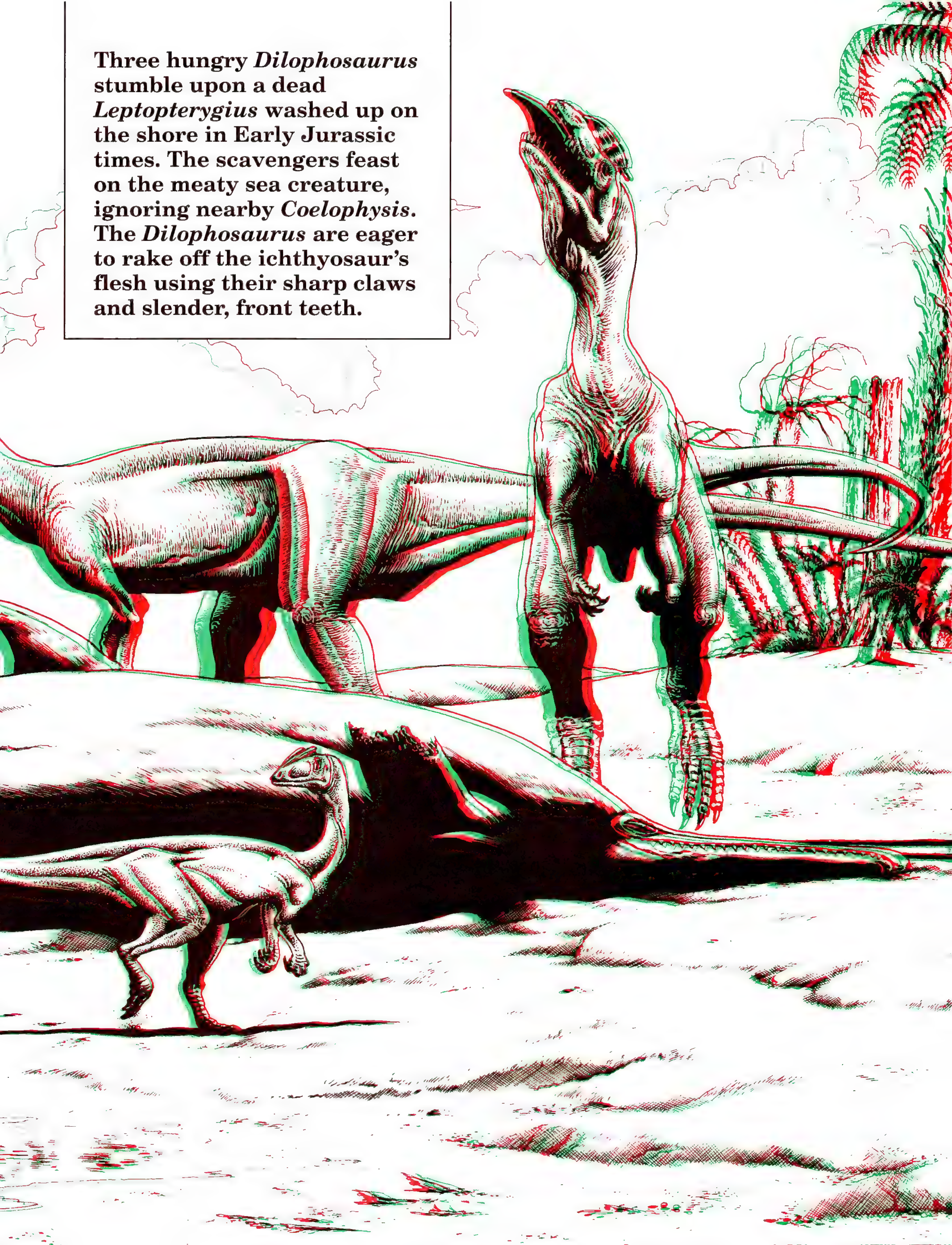
A herd of *Bothriospondylus* lumbers along the fern-fringed shores of an African lake. Toe claws will help the plant-eaters to grip the ground when they stretch out their long necks for a drink. As the herd moves off, it leaves large trackways behind. Millions of years later, experts use the fossilized footprints to learn more about the journeys of these sauropods.

3-D Gallery 60

DILOPHOSAURUS



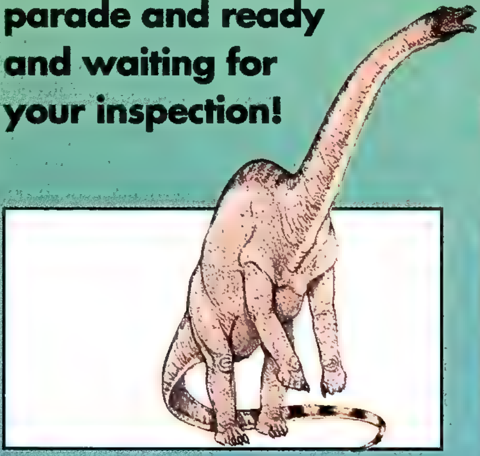
Three hungry *Dilophosaurus* stumble upon a dead *Leptopterygius* washed up on the shore in Early Jurassic times. The scavengers feast on the meaty sea creature, ignoring nearby *Coelophysis*. The *Dilophosaurus* are eager to rake off the ichthyosaur's flesh using their sharp claws and slender, front teeth.



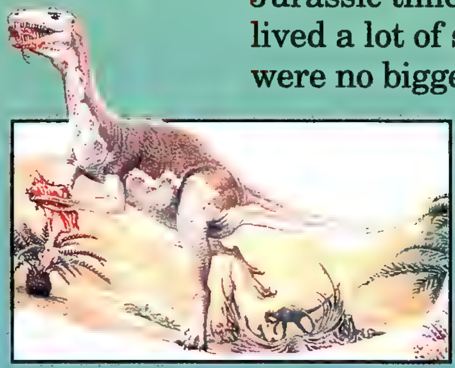
Jurassic dinosaurs on parade

The Jurassic dinosaurs are on parade and ready and waiting for your inspection!

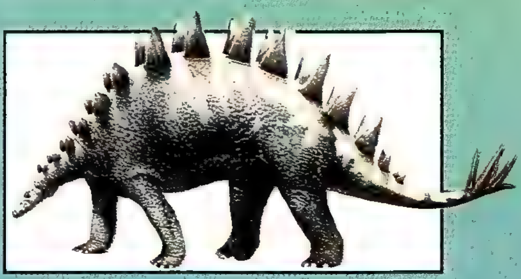
Some of the tallest, heaviest and longest plant-eating and meat-eating dinosaurs ruled Jurassic times. But alongside these giants lived a lot of smaller dinosaurs too – some were no bigger than a chicken!



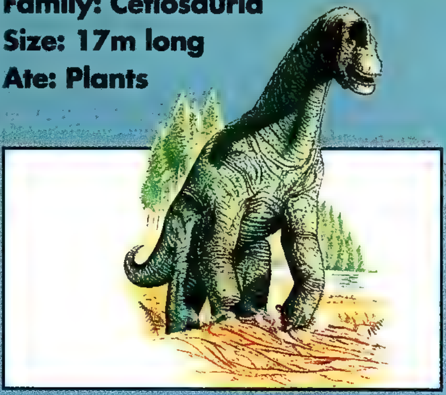
Name: ***Rhoetosaurus***
Family: **Cetiosaurid**
Size: **17m long**
Ate: **Plants**



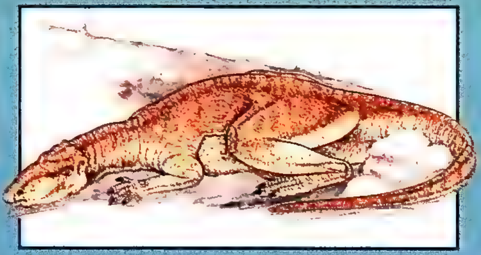
Name: ***Ornitholestes***
Family: **Coelurosaurid**
Size: **2m long**
Ate: **Meat**



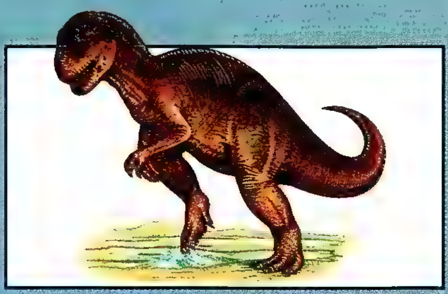
Name: ***Tuojiangosaurus***
Family: **Stegosaurid**
Size: **7m long**
Ate: **Plants**



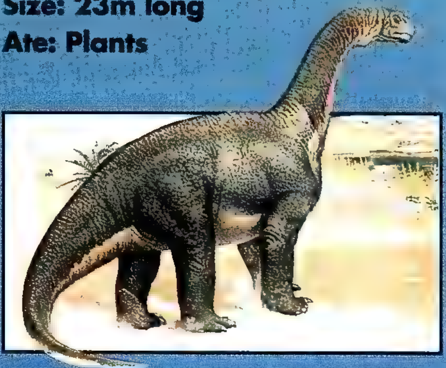
Name: ***Brachiosaurus***
Family: **Brachiosaurid**
Size: **23m long**
Ate: **Plants**



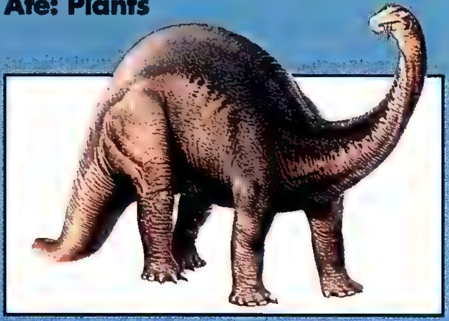
Name: ***Abrictosaurus***
Family: **Heterodontosaurid**
Size: **1.2m long**
Ate: **Plants**



Name: ***Allosaurus***
Family: **Allosaurid**
Size: **12m long**
Ate: **Meat**



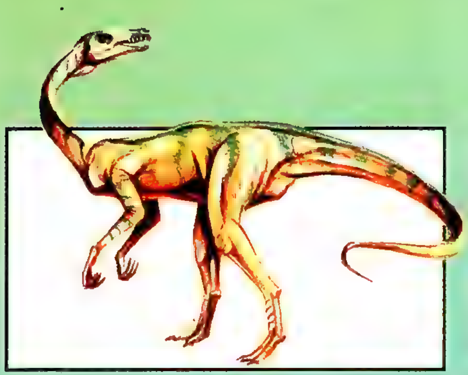
Name: ***Camarasaurus***
Family: **Camarasaurid**
Size: **18m long**
Ate: **Plants**



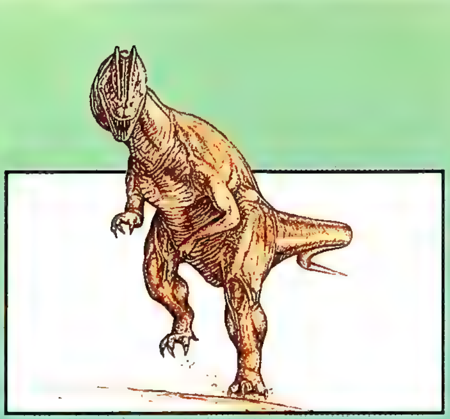
Name: ***Apatosaurus***
Family: **Diplodocid**
Size: **21m long**
Ate: **Plants**

Name: ***Lesothosaurus***
Family: **Fabrosaurid**
Size: **1m long**
Ate: **Plants**

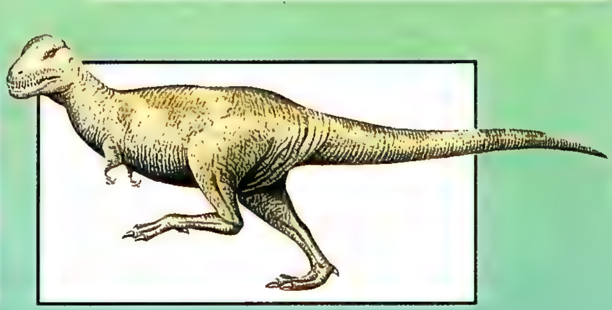
SPOTTER'S GUIDE



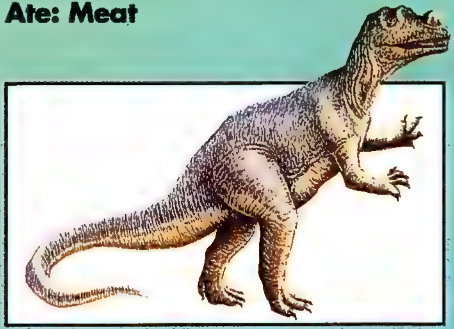
Name: *Compsognathus*
Family: Compsognathid
Size: 60cm long
Ate: Meat



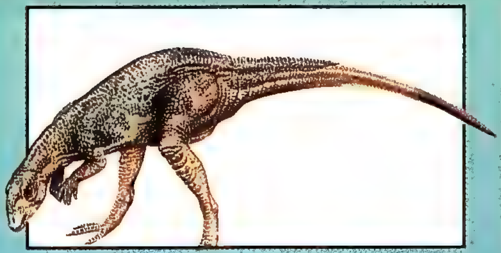
Name: *Dilophosaurus*
Family: Ceratosaurid
Size: 6m long
Ate: Meat



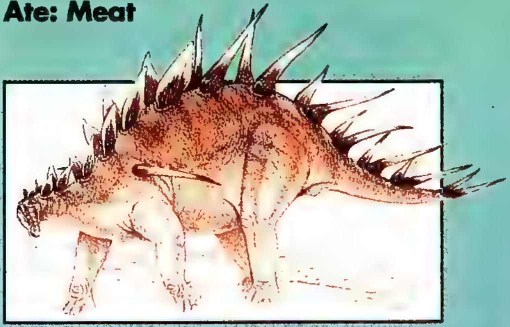
Name: *Eustreptospondylus*
Family: Megalosaurid
Size: 6m long
Ate: Meat



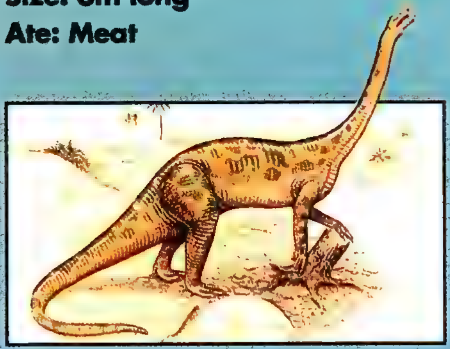
Name: *Ceratosaurus*
Family: Ceratosaurid
Size: 6m long
Ate: Meat



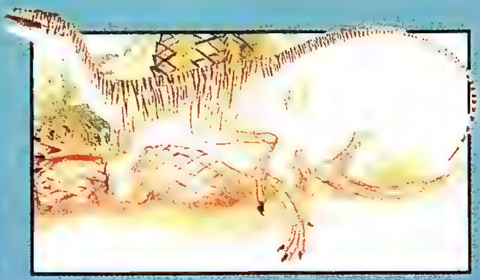
Name: *Dryosaurus*
Family: Dryosaurid
Size: 4m long
Ate: Plants



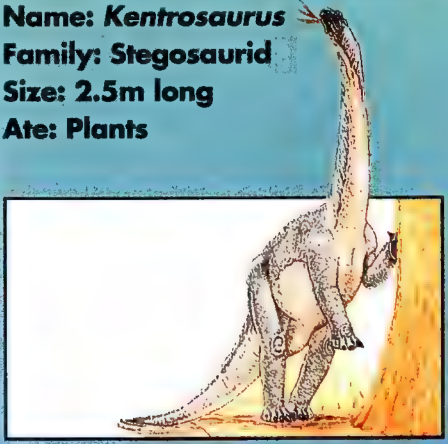
Name: *Kentrosaurus*
Family: Stegosaurid
Size: 2.5m long
Ate: Plants



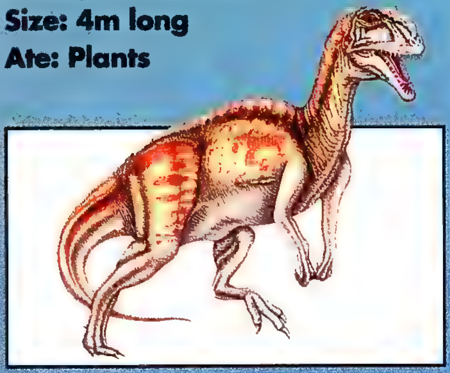
Name: *Massospondylus*
Family: Plateosaurid
Size: 4m long
Ate: Plants



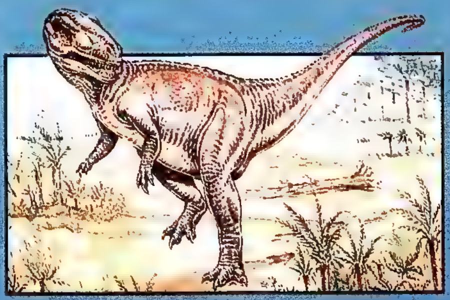
Name: *Coelurus*
Family: Coelurosaurid
Size: 2m long
Ate: Meat



Name: *Barapasaurus*
Family: Cetiosaurid
Size: 18m long
Ate: Plants



Name: *Yangchuanosaurus*
Family: Unknown
Size: 6m long
Ate: Meat



Name: *Megalosaurus*
Family: Megalosaurid
Size: 7–9m long
Ate: Meat

KEY

TRIASSIC:
245 – 204 million years ago

JURASSIC:
204 – 140 million years ago

CRETACEOUS:
140 – 66 million years ago

The secrets of

Elephants, hippopotamuses and lions roaming free in the heart of a great city – unthinkable! But 100,000 years ago, Trafalgar Square in London, England, looked very different.

Thousands of years ago, parts of the world were often much warmer than they are now. Plants and animals that today live only in warm countries such as Africa, once thrived in countries like Britain. How do we know? Because their fossils have been found in the most unexpected places.

BUILDERS' BREAKTHROUGH

In 1957, workmen digging on a building site in Trafalgar Square, London, England, found some fossils. Experts were called in and the site was excavated.

PICTURE FROM THE PAST

A stone's throw from the Square's fountains and Nelson's Column, the palaeontologists discovered fossils of animals that are no longer found in Britain today. These fossils gave the scientists an incredible picture of the past. Wild animals including lions and bears once lived in Britain!

Hundreds of thousands of years ago, all sorts of prehistoric animals lived under the site of today's Trafalgar Square in London, England.

Trafalgar Square

TRAFALGAR SWAMP

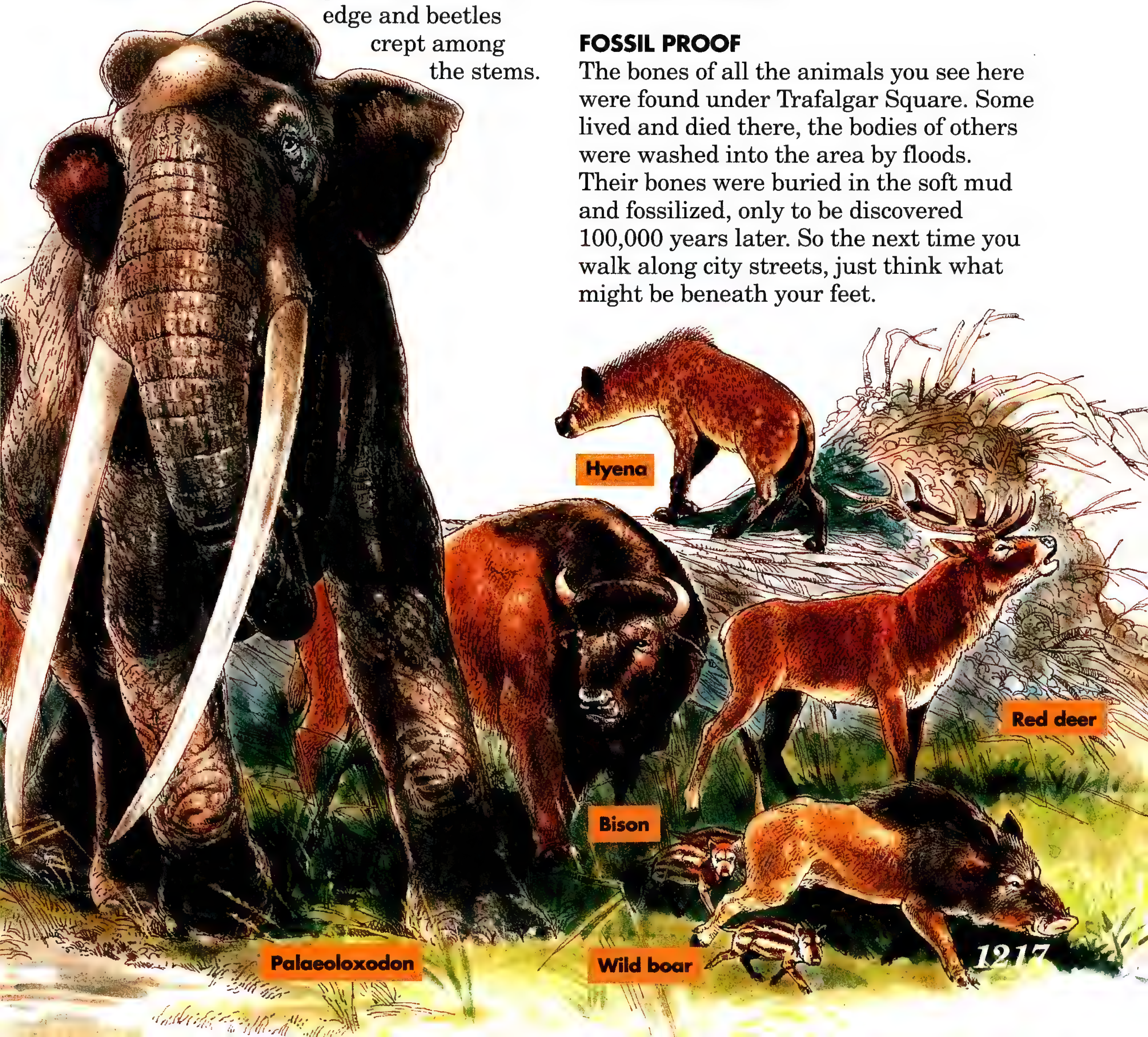
The River Thames in London was once much wider than it is today. About 100,000 years ago, marshes and bogs lined its banks. Trafalgar Square was a marsh and was joined to the river by several streams. Water lilies and reeds grew at the water's edge and beetles crept among the stems.

THAMES WALLOW

Among the larger animals that lived in the marshes, or came down from the nearby hills to drink from the river, were elephants, cave lions, brown bears and bison. Hippopotamuses even wallowed in the River Thames!

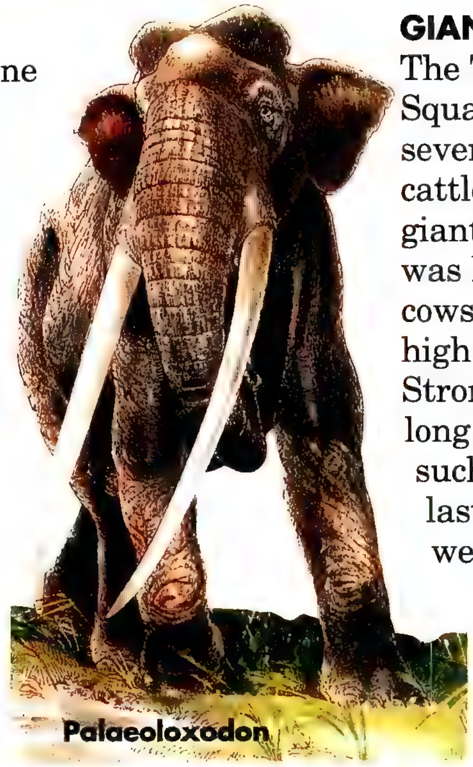
FOSSIL PROOF

The bones of all the animals you see here were found under Trafalgar Square. Some lived and died there, the bodies of others were washed into the area by floods. Their bones were buried in the soft mud and fossilized, only to be discovered 100,000 years later. So the next time you walk along city streets, just think what might be beneath your feet.



ANCIENT ELEPHANT

Palaeoloxodon was one of the animals found under Trafalgar Square. It was a large elephant with very long, straight tusks. It spread across Europe from Asia about 400,000 years ago. It probably lived in forests or open woodland, eating leaves and plants. The last *Palaeoloxodon* died out about 70,000 years ago.



Palaeoloxodon

GIANT CATTLE

The Trafalgar Square fossils revealed several different kinds of cattle. The auroch was a giant form of cattle. It was larger than today's cows, and was about 2m high at the shoulder. Strong and powerful, the auroch used its long horns to charge at any predators, such as cave lions, that threatened it. The last auroch died in Poland in 1627. Bison were also found in Trafalgar Square. They lived in dense forests and woodland and ate leaves and acorns. The wild bison is now very rare and only a few hundred survive in the forests of Poland and Russia.

Auroch

Today's wild boar

Modern bison

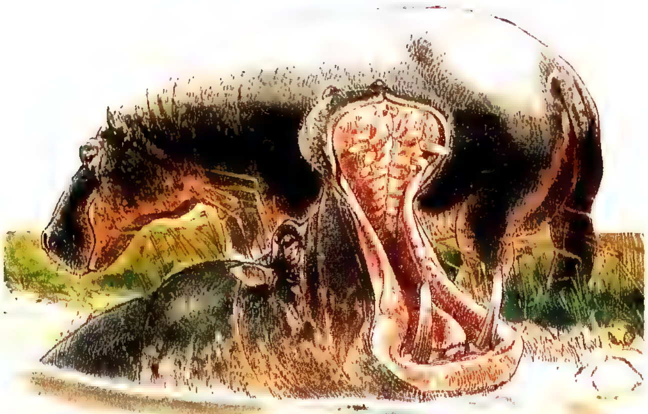
PIG HISTORY

Wild boar no longer live in Britain, but their fossils were found at the Trafalgar Square dig. Today, they can only be found in the forests of central Europe. They dig up roots and eat a wide variety of plants. The domestic pig was bred from the wild boar about 10,000 years ago in Turkey.

GREAT SURVIVOR

The red deer was one of the largest deer found in Trafalgar Square. It stood about 1.6m tall and used its antlers to fight rivals. Large herds of red deer still live in Europe, North America, Africa and northern Asia. Red deer usually feed on leaves and buds at dawn and dusk, hiding in forests during the day.

Red deer



Hippopotamus

HAPPY HIPPO

The hippopotamus lived in the swamps along the Thames. It spent the day in the water where it was safe from attack. At dusk it climbed onto dry land to look for grass and fruits. Today, the hippopotamus lives only in Africa where the weather is warm enough for it to survive.

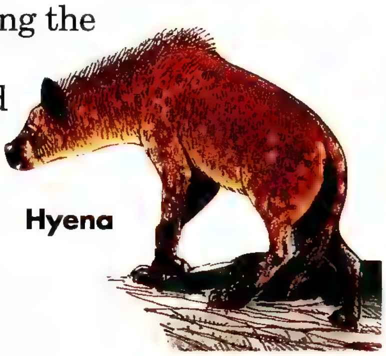
TRAFALGAR HUNTERS

The cave lion was the biggest hunter found in Trafalgar Square. It was similar to the modern lion except that it was much bigger and the males had no manes. The Trafalgar Square lions probably lived in caves in nearby hills and came down to the river to snatch prey. The last cave lion died about 2,000 years ago in Greece.

Today's lion

HYENAS ON THE PROWL

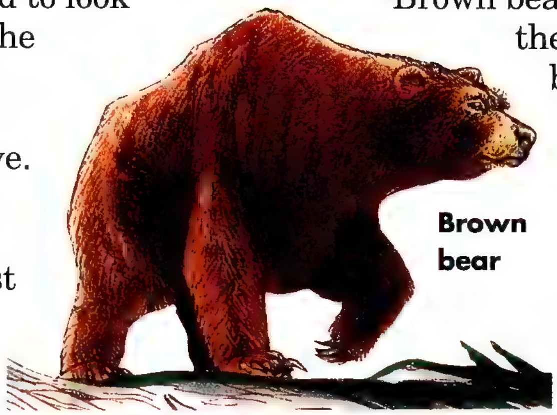
Modern hyenas can only be found in Africa and Asia, but 100,000 years ago these ruthless hunters lived across most of Europe, including the area around the River Thames and Trafalgar Square. Like today, they would have hunted in packs, preying on weaker animals.



Hyena

SQUARE BEARS

Brown bear fossils were found in the Square too. This bear became extinct in Britain 600 years ago, but it is still found in parts of Europe, Asia and North America. The brown bear is an omnivore – it eats fruit, nuts, roots, honey, fish and even the bodies of dead animals.



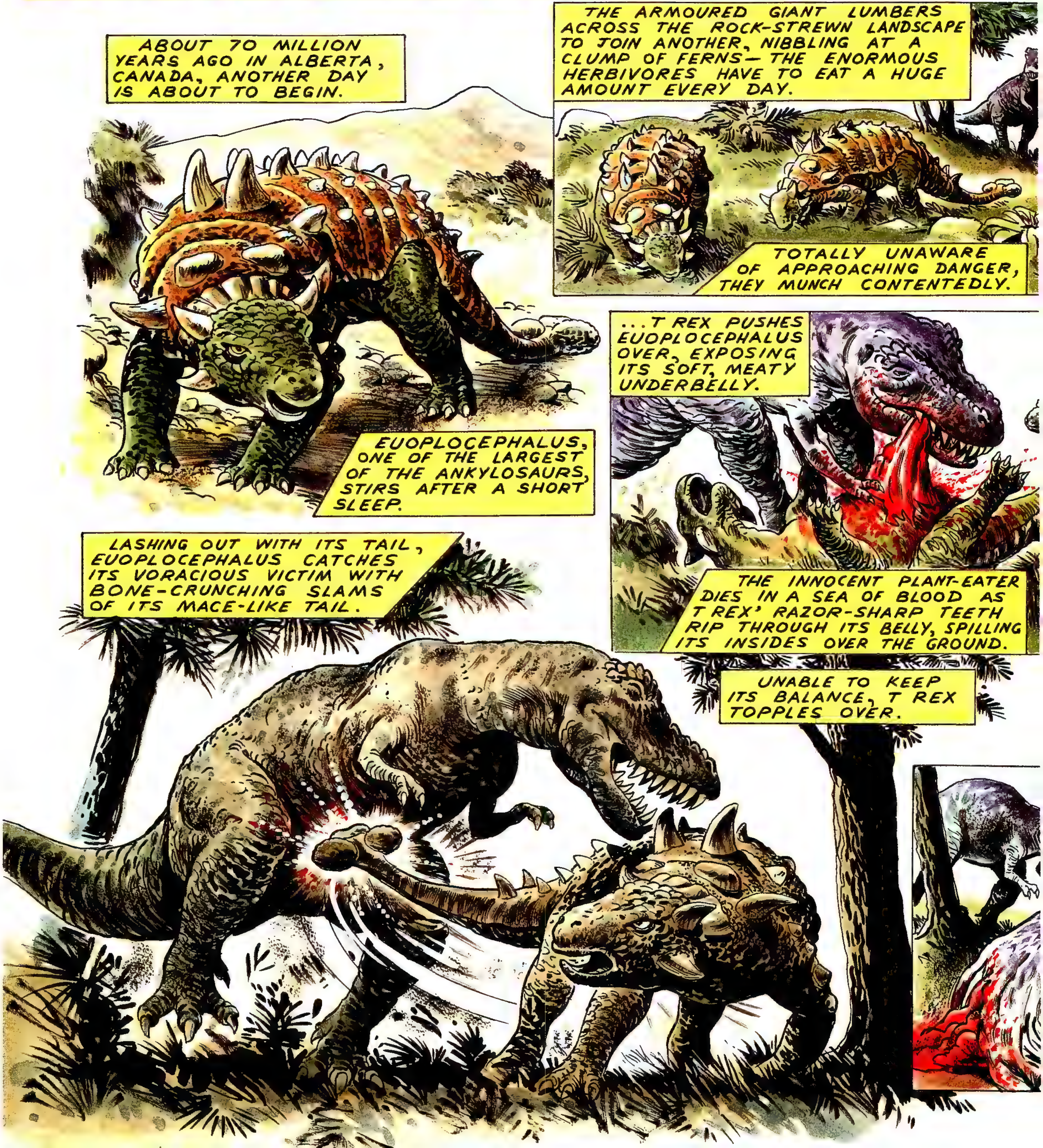
Brown bear

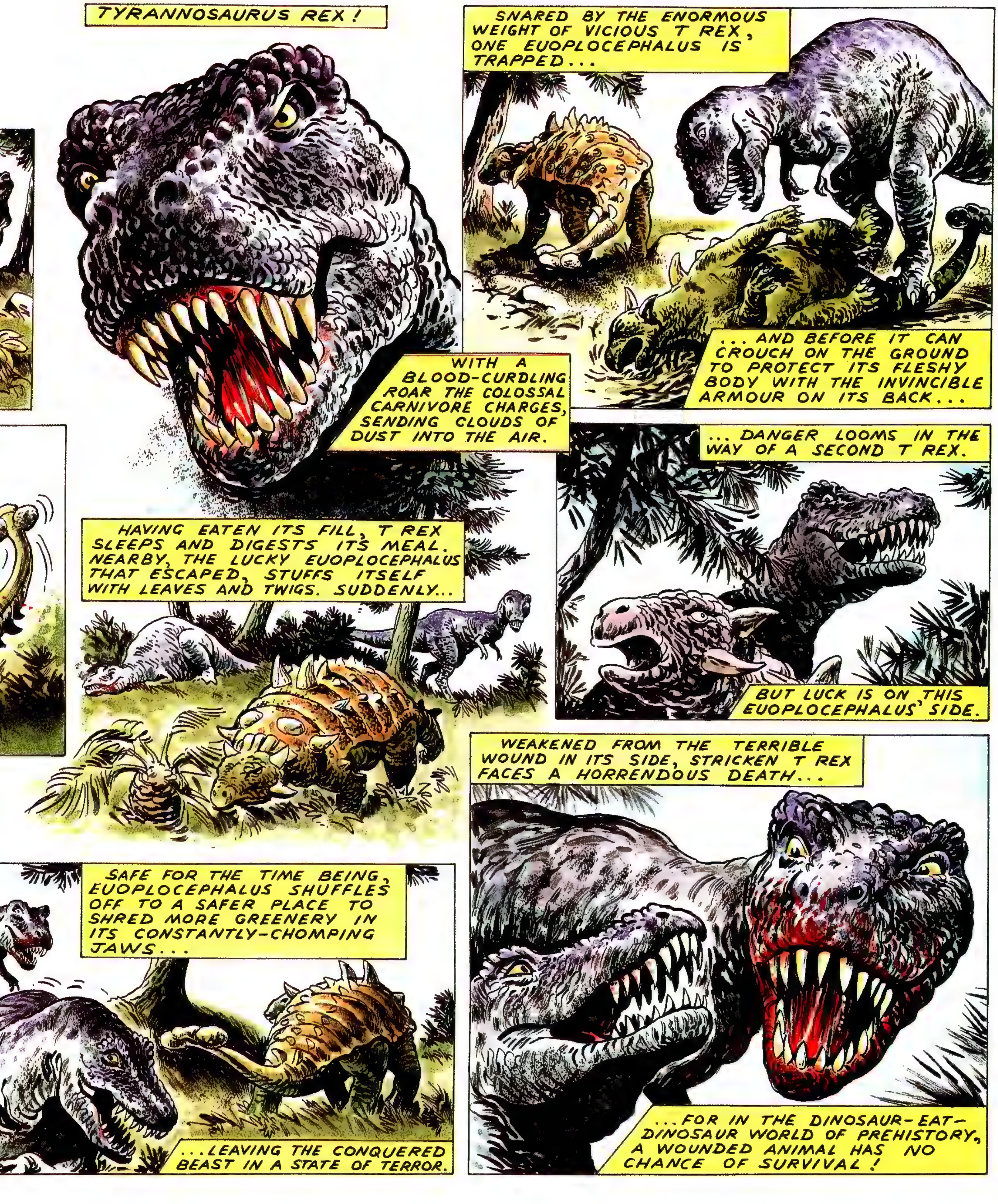
IT'S A FACT

GLOBAL WARMING

The climate of the Earth has been getting warmer for about 13,000 years – since the last Ice Age ended. Some scientists think that gases released by industry and pollution are speeding up this warming process. If the Earth becomes much warmer, then plants and animals that now live in cool climates may have to change.

A DAY IN THE LIFE OF EUOPLOCEPHALUS


ABOUT 70 MILLION YEARS AGO IN ALBERTA, CANADA, ANOTHER DAY IS ABOUT TO BEGIN.
EUOPLOCEPHALUS, ONE OF THE LARGEST OF THE ANKYLOSAURS, STIRS AFTER A SHORT SLEEP.
THE ARMOURED GIANT LUMBERS ACROSS THE ROCK-STREWN LANDSCAPE TO JOIN ANOTHER, NIBBLING AT A CLUMP OF FERNS— THE ENORMOUS HERBIVORES HAVE TO EAT A HUGE AMOUNT EVERY DAY.
TOTALLY UNAWARE OF APPROACHING DANGER, THEY MUNCH CONTENTEDLY.
...T REX PUSHES EUOPLOCEPHALUS OVER, EXPOSING ITS SOFT, MEATY UNDERBELLY.
THE INNOCENT PLANT-EATER DIES IN A SEA OF BLOOD AS T REX' RAZOR-SHARP TEETH RIP THROUGH ITS BELLY, SPILLING ITS INSIDES OVER THE GROUND.
LASHING OUT WITH ITS TAIL, EUOPLOCEPHALUS CATCHES ITS VORACIOUS VICTIM WITH BONE-CRUNCHING SLAMS OF ITS MACE-LIKE TAIL.
UNABLE TO KEEP ITS BALANCE, T REX TOPPLES OVER.


TYRANNOSAURUS REX!
WITH A BLOOD-CURDLING ROAR THE COLOSSAL CARNIVORE CHARGES, SENDING CLOUDS OF DUST INTO THE AIR.
HAVING EATEN ITS FILL, T REX SLEEPS AND DIGESTS ITS MEAL. NEARBY, THE LUCKY EUOPLOCEPHALUS THAT ESCAPED, STUFFS ITSELF WITH LEAVES AND TWIGS. SUDDENLY...
SAFE FOR THE TIME BEING, EUOPLOCEPHALUS SHUFFLES OFF TO A SAFER PLACE TO SHRED MORE GREENERY IN ITS CONSTANTLY-CHOMPING JAWS...
...LEAVING THE CONQUERED BEAST IN A STATE OF TERROR.
SNARED BY THE ENORMOUS WEIGHT OF VICIOUS T REX, ONE EUOPLOCEPHALUS IS TRAPPED...
...AND BEFORE IT CAN CROUCH ON THE GROUND TO PROTECT ITS FLESHY BODY WITH THE INVINCIBLE ARMOUR ON ITS BACK...
...DANGER LOOMS IN THE WAY OF A SECOND T REX.
BUT LUCK IS ON THIS EUOPLOCEPHALUS' SIDE.
WEAKENED FROM THE TERRIBLE WOUND IN ITS SIDE, STRICKEN T REX FACES A HORRENDOUS DEATH...
...FOR IN THE DINOSAUR-EAT-DINOSAUR WORLD OF PREHISTORY, A WOUNDED ANIMAL HAS NO CHANCE OF SURVIVAL!

Improve and test your knowledge with...

FACT FILE

Ichthyosaurus holds all the answers. See how you score in the quiz.

Fake fossil

The oldest fly in the world is a fake! The fly, trapped in amber, is part of the Natural History Museum's prehistoric collection. But keen-eyed student Andrew Ross noticed a faint line in the amber and a bubble around the fly. Further investigation revealed that, far from being prehistoric, the fly was artificially placed in the amber in the last century!

1 ***Bothriospondylus'* name means:**
a) excavated vertebrae
b) water dinosaur
c) fat dinosaur

2 ***Bothriospondylus* had a neck like:**
a) a duck
b) a giraffe
c) a donkey

3 ***Szechuanosaurus* lived in:**
a) Africa
b) China
c) America

4 **How many pairs of spines did *Hallucigenia* have on its back?**
a) seven
b) 12
c) two

5 **Roughly how many fossils were found in the Burgess Shale?**
a) 65,000
b) 200
c) 10,000

6 **The sea creature *Canadia* was:**
a) a lobster
b) a sea cucumber
c) a bristle-worm

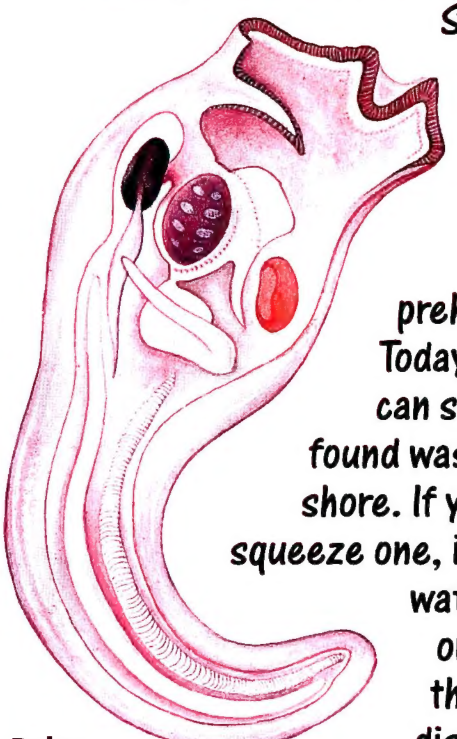
7 **What family did *Apatosaurus* belong to?**
a) cetiosaurid
b) plateosaurid
c) diplodocid

8 ***Allosaurus* ate:**
a) meat
b) plants
c) people

Ancient stone blankets

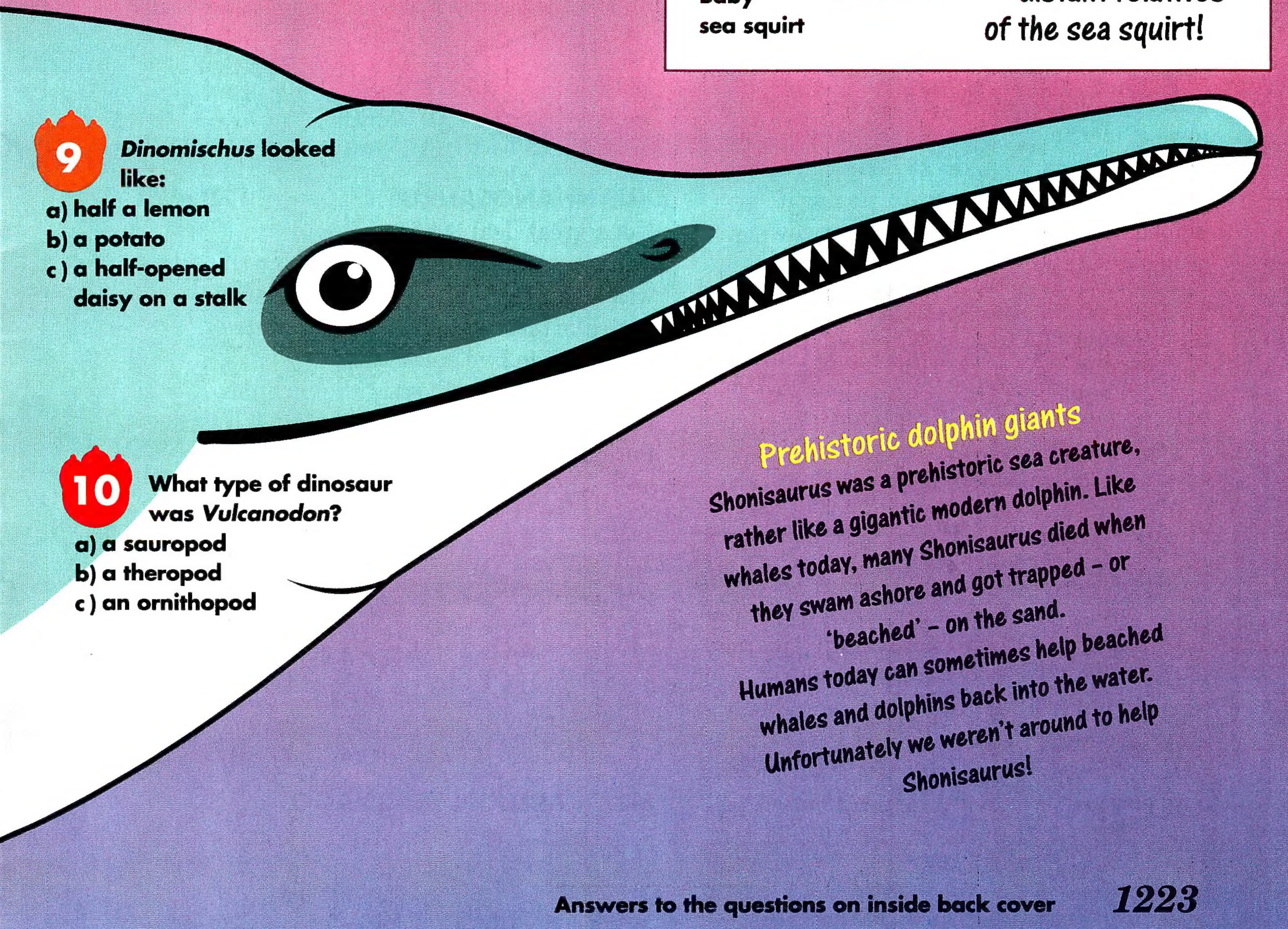
In Precambrian times, the seas swarmed with tiny plant cells, called blue-green algae. Today, amazing 'stone blankets', called stromatolites and made of limestone, are found in these same seas. These 'blankets' were made by the algae almost 3,000 million years ago. Fewer stromatolites formed after the Precambrian Period because by then snails had evolved, and the snails ate the algae before the algae had a chance to build the limestone. Some of the best stromatolites are in Shark Bay, Australia, where the water is too salty for snails.

Are you a little squirt?!



Baby sea squirt

Sea squirts are weird, jelly-covered sea creatures which also lived in prehistoric times. Today's sea squirts can sometimes be found washed up on the shore. If you were to squeeze one, it would squirt water! Believe it or not, experts think we may be distant relatives of the sea squirt!



9 *Dinomischus* looked like:

a) half a lemon
b) a potato
c) a half-opened daisy on a stalk

10 What type of dinosaur was *Vulcanodon*?

a) a sauropod
b) a theropod
c) an ornithopod

Prehistoric dolphin giants

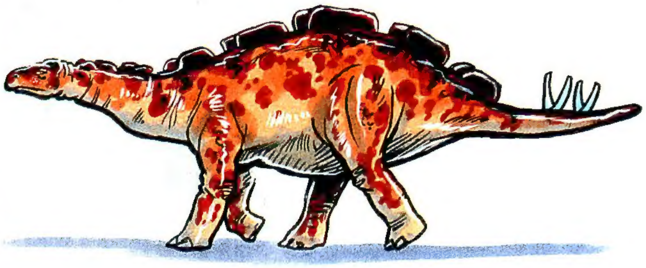
Shonisaurus was a prehistoric sea creature, rather like a gigantic modern dolphin. Like whales today, many Shonisaurus died when they swam ashore and got trapped – or 'beached' – on the sand. Humans today can sometimes help beached whales and dolphins back into the water. Unfortunately we weren't around to help Shonisaurus!

VULCANODON 185 MYA

Vulcanodon (vul-kan-oh-don) means 'volcano tooth'. This plant-eating sauropod was named after some strange jagged teeth found near its headless fossil. *Vulcanodon* was as long as an elephant and walked on four sturdy legs. It lived in Zimbabwe, Africa, in the Early Jurassic and was probably one of the earliest sauropods ever discovered.

WUERHOSAURUS 130 MYA

A stegosaur from the Wuerho region of China, *Wuerhosaurus* (hwer-o-saw-rus) was about as long as two rhinoceroses and walked on four legs. *Wuerhosaurus* had two rows of low bony plates along its neck and back. Four sharp spikes stood out near the end of its tail for extra protection as it dipped its small head to browse on low-growing plants.



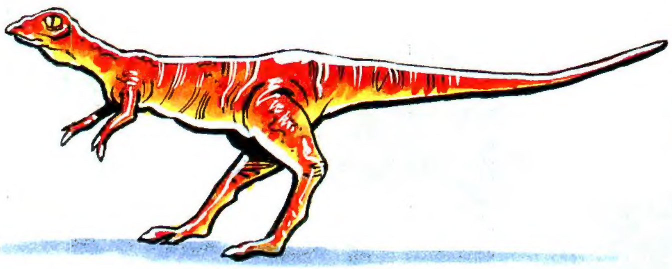
X

XENOTARSOSAURUS 75 MYA

Flesh-eating *Xenotarsosaurus* (zeno-tar-soh-saw-rus) lived in Argentina, South America, in the Late Cretaceous. Its name means 'strange ankle lizard'. Only two spinal bones and some hind leg bones were found but its unusual fused ankle bones intrigued experts. *Xenotarsosaurus* chased its prey on two legs.

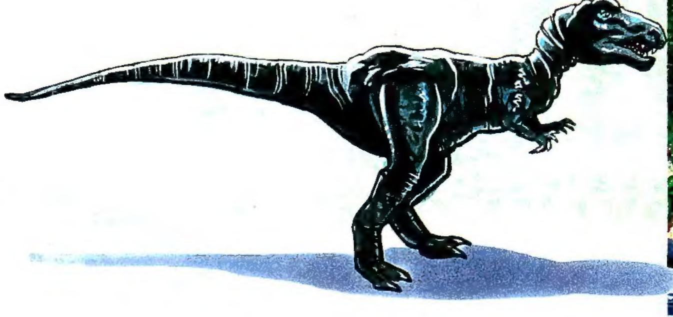
XIAOSAURUS 160 MYA

A small plant-eater about 1m long, *Xiaosaurus* (zwow-saw-rus) looked very like *Fabrosaurus*. Fossils of its jaws and one of its legs were found in Sichuan Province, China, in the 1980s. *Xiaosaurus* ran on two legs with its tail held out stiffly behind. Its name means 'little reptile' and its head would have just reached an adult human's knees.



XUANHANOSAURUS 170 MYA

Not a great deal is known about *Xuanhanosaurus* (zwan-han-o-saw-rus). It was a two-legged flesh-eater and looked very like *Megalosaurus* and *Allosaurus*. Longer than two small cars, *Xuanhanosaurus* lived in the Sichuan Province in China during the Mid Jurassic Period and was named after Xuanhan, the area where it was found.

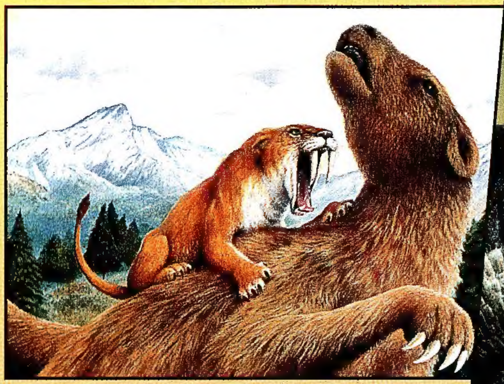


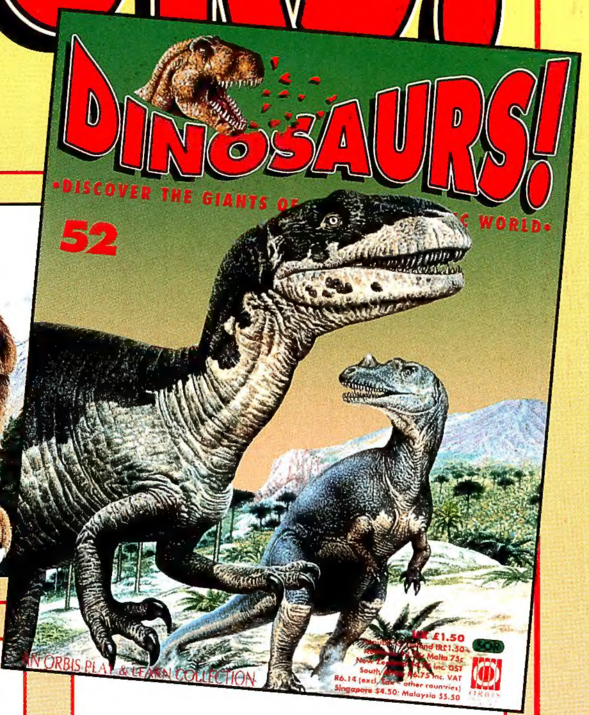
MYA = MILLION YEARS AGO

COMING IN PART 52 OF

DINOSAURS!

How did prehistoric cats kill their prey? Find out in PREHISTORIC WORLD. Identify the last of the dinosaurs in SPOTTER'S GUIDE.

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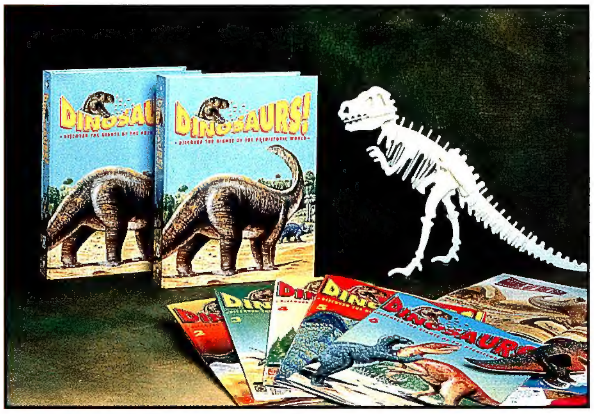

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PLUS

Catch up on more amazing monster facts in
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and
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3-D GALLERY
HISTORY IN PICTURES

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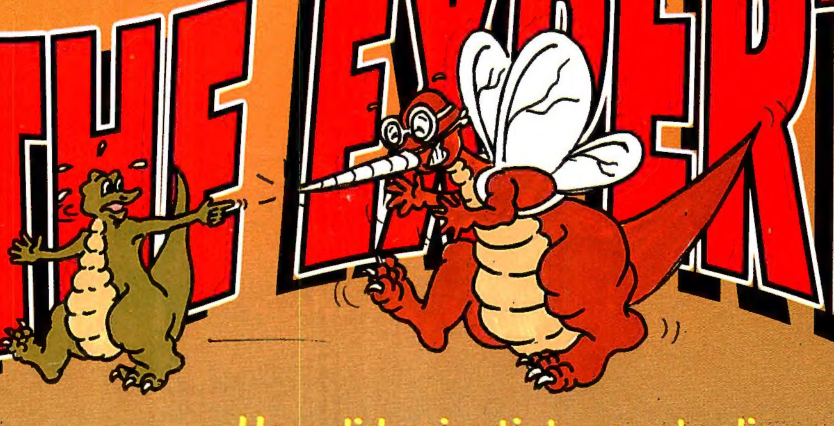
ANSWERS TO FACT FILE QUESTIONS: 1.a 2.b 3.b 4.a 5.a 6.c 7.c 8.a 9.c 10.a

Dr. David Norman of Cambridge University answers your dinosaur questions

ASK THE EXPERT

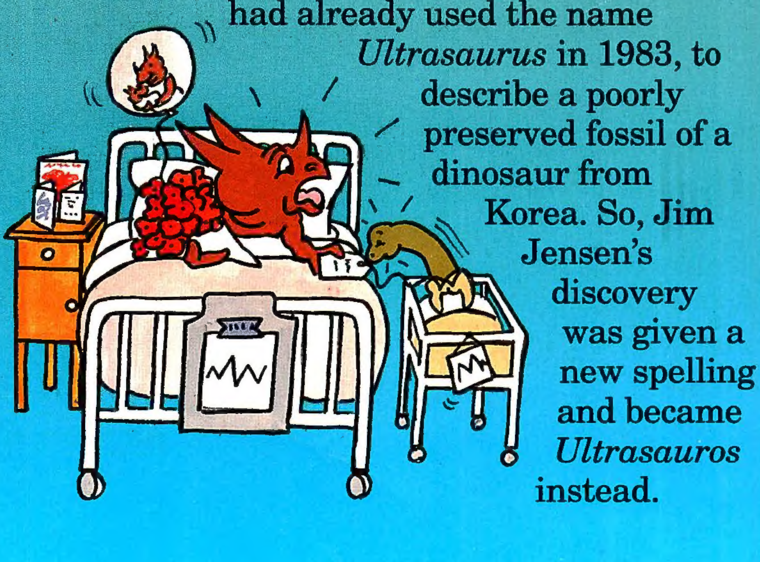


What is prehistory?

Prehistory means literally 'before history'. By this we mean before historical records were made. Written words – made either on paper, parchment or as figures printed on baked clay tablets – give historians genuine evidence which they can study. However, in prehistoric times – before humans left a written record – it is only possible to piece together history from the artefacts that were left behind.

Have dinosaurs ever been given the wrong name?

Unfortunately, yes! A very recent example is the dinosaur *Ultrasaurus*. In 1985, this name was used by Jim Jensen to describe a new brachiosaur that had been discovered in North America. But, it has recently been pointed out that a Korean scientist named Kim had already used the name *Ultrasaurus* in 1983, to describe a poorly preserved fossil of a dinosaur from Korea. So, Jim Jensen's discovery was given a new spelling and became *Ultrasauros* instead.



How did scientists create dinosaurs in the film, 'Jurassic Park'?

In 'Jurassic Park', scientists suck out dinosaur blood from a mosquito that was trapped in amber (the hardened sap of a tree) and then extract and multiply the genetic material of the dinosaur from the tiny blood sample! They put the genetic material into a donor egg and grow a new dinosaur. Although, even today, amber can be found to contain insects which are millions of years old, the rest IS JUST A STORY!

Why were most mammals from the Age of the Dinosaurs nocturnal?

Nobody knows for certain. All we know is that the mammals that lived during the time of the dinosaurs were small and had similar features to today's nocturnal mammals. It seems quite likely that they could survive better in the cool nights of the Mesozoic world. During the day, the weather was very hot and much better suited to big, active reptiles like the dinosaurs.

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